American Machinist

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Commemoration and Rededication

A brief informal account of the ceremonies incident to the Fiftieth Anniversary of the American Society of Mechanical Engineers

SHORTLY after nine o'clock on Saturday, April 5, John Sweet, grand-nephew of Prof. John E. Sweet, founder and former president of the American Society of Mechanical Engineers, unveiled the tablet commemorating the Fiftieth Anniversary of the Society. Charles E. Gorton, vice-president of the Society, was the presiding officer, and the address of the morning was made by Charles T. Main, past-president. Official delegates, members of the Society, and their friends had been registering since the previous evening, the total approximating 2,000.

Immediately after the unveiling, the first official act of the celebration, 600 delegates departed by special bus for the McGraw-Hill building, as guests of *American Machinist* and the McGraw-Hill Publishing Company, its publishers. Almost providentially the Circulation Department had moved from the 13th floor, and the space had been held vacant for the A.S.M.E. festivities. There Malcolm Muir, president of the McGraw-Hill Publishing Company, welcomed the delegates, and William Elmer, vice-president of the Society, responded. K. H. Condit, editor and publishing director of *American Machinist*, was master of ceremonies.

A fifteen-minute playlet by J. P. Newman, manager of the Marketing Counsellors' Staff, took the guests back fifty years. With the stage set to represent the 1880 offices of *American Machinist*, then located at 96 Fulton Street, New York, Jackson Bailey, first editor, and Horace B. Miller, publisher, discussed the preliminary meeting of the A.S.M.E., which was to be held three days later, endeavoring to anticipate and make allowances for the wide variety of engineering temperaments which would be assembled for the organization of the Society. There, Mr. Miller proposed the dinner at the

Above—Six hundred members of the A.S.M.E., guests of McGraw-Hill and the *American Machinist*. Right—The guests arrive by chartered buses

Astor House which has gone down into history for its good food and wines. As Mr. Muir mentioned in his address of welcome, the old-time dinner disregarded all our new-found principles of nutrition, dietetics, and capacities, yet resulted in complete harmony among the founders.

An inspection of a 1930 publishing plant followed. The visitors were shown from floor to floor of the building, viewing the editorial offices, composing room, engraving department, press room, illustration department, mailing department, and bindery. Following this tour of inspection, a buffet luncheon was served on the 13th floor. Conforming to all pure food and other laws, this luncheon was a striking contrast with that of 50 years before. Even though knees replaced the substantial banquet tables of the Old Astor House, the tomato bisque, chicken patties, salads, sandwiches, ice cream, cakes, and coffee found a receptive audience.

As soon after 1:10 p.m. as the visitors could be enticed from the sandwich tables, they were taken by bus to the Stevens Institute of Technology for the anniversary pageant. It was at Stevens Institute in 1880, in the very same room which housed the pageant, that the organization meeting of the Society was held at the invitation of Dr. Henry Morton, first president of Stevens. There it was that the first election of officers was held and the first constitution was framed. The debates of that meeting were reproduced in one of the scenes of the pageant.

Traced through the scenes of the pageant was the growth of man's control over the forces of nature, bound

Pictorial Press Photo

Pictorial Press Photo

Two scenes from the pageant at Stevens Institute of Technology—"Control" and "Mystery," and "Stephenson pleading before Parliament."

together through the character, "Control," who at first appearance is a child and who at length attains the stature of a man. In the pageant there were five realistic seenes, each a one-act play. In one, Boulton comes to Watt offering him financial support—the alliance of invention and finance. In another, Stephenson appears before a committee of Parliament to plead for a charter for his railroad to Manchester. In a third, Faraday in the Ashmolean Museum, declines to desert research and commercialize his discoveries. In the fourth, the Society begins its work for the co-ordination of the labor of individuals. The fifth shows Edison on the day of his first use of electricity in lighting a building. By moving pictures and by pantomime these scenes revealed that in every age, engineering in some form has been one of the fundamental means by which civilization has advanced. A second performance of the pageant was given for those who preferred the later hour or who could not be accommodated at the first presentation.

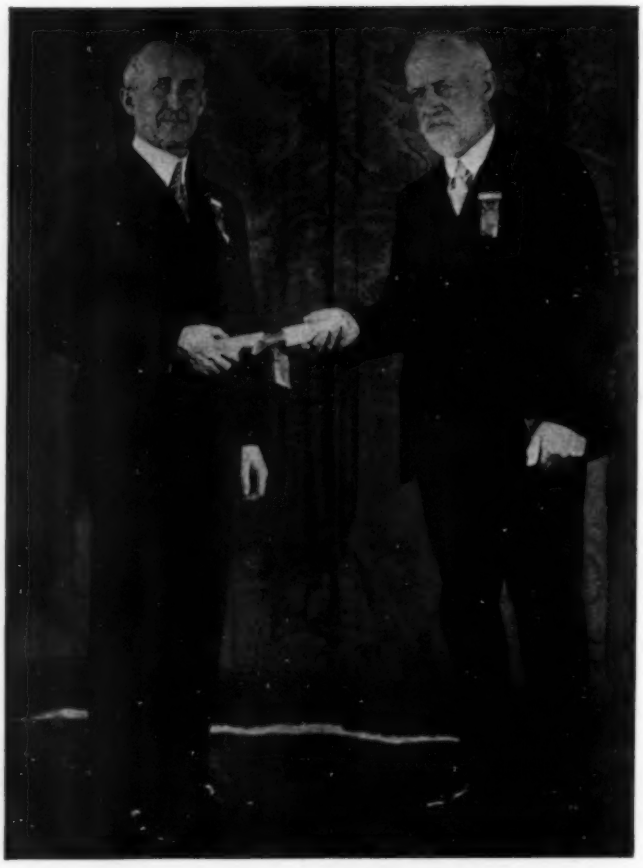
Charles M. Schwab, honorary member and past-president of the Society, was toastmaster at the welcoming dinner given by the Metropolitan Section in the Roosevelt Hotel's grand ball room on Saturday evening. Paul Doty, vice-president of the Society, delivered the address

of welcome. Edward J. Mehren, vice-president of the McGraw-Hill Publishing Company, representing the engineering press, and Robert I. Rees, president of the Society for the Promotion of Engineering Education, representing engineering education, delivered the addresses of the evening. Again the menu failed to equal that of the memorable meeting of fifty years before, especially in certain liquid items.

Unfortunately for them, official delegates from foreign countries and from the local sections were required to present their credentials at the Engineering Societies Building at 9:30 a.m. on Sunday. At eleven, commemorative services were held at the Cathedral of St. John the Divine, to which the official party was led by Robert L. Dougherty, vice-president of the Society. The observances at the Cathedral concluded the New York and Hoboken portion of the program, the delegates entraining for Washington, D. C., during the afternoon and evening.

Washington's famed Japanese cherry blossoms greeted them the following morning, the delegates registering at 8:30. The welcoming assembly in the National Council Chamber in the U. S. Chamber of Commerce Building followed in due order, with Ralph E. Flanders, vice-president of the Society, as the presiding officer. Mr. Flanders also delivered the address of welcome, after which greetings and addresses were presented by delegates from 21 foreign engineering organizations.

John F. Coleman, president of the American Society of Civil Engineers, William H. Bassett, president of the American Institute of Mining and Metallurgical Engineers, and Harold B. Smith, president of the American



Above Right — Orville Wright receives the first award of the Guggenheim Medal from Dr. W. F. Durand

Right—A group of famous engineers from all over the world, medallists at the Fiftieth Anniversary observances

Henry Miller Photos.

Institute of Electrical Engineers, conveyed the greetings and congratulations of their organizations. Palmer C. Ricketts, president of Rensselaer Polytechnic Institute, spoke for the engineering institutions of the United States. Maj.-Gen. George O. Squier of the National Academy of Sciences conveyed the greetings of scientific and professional societies of the United States, and William Butterworth, president of the United States Chamber of Commerce, those of the business organizations of the United States.

That afternoon the first part of the session on the Influence of Engineering Upon Civilization was given in the National Council Chamber with Charles E. Gorton presiding. Ten minute summaries of the monographs of the first nine delegates were presented. The Officers and Council of the Society received the delegates and visitors at a reception in the Chinese Room and Ballroom of the Mayflower Hotel at 9 p.m., that evening. A buffet supper was later served and the visitors enjoyed dancing.

A special dinner was given the medallists at the Cosmos Club that evening, with C. E. Grunsky, president of the American Engineering Council, presiding. Ralph Flanders represented the A.S.M.E., and the guests included the presidents of the A.I.E.E., the A.S.C.E., and the A.S.Ch.E.

The second part of the session on the Influence of Engineering Upon Civilization was held on Tuesday morning, with William Elmer, vice-president of the Society, presiding. The remaining seven summaries of monographs were presented, followed by the presentation

of a report entitled, "A Half-Century of Progress in Mechanical Engineering in the United States," prepared by the Professional Divisions of the Society and their representatives. Dr. Fred Low presented the report and the summarizing address.

Ambrose Swasey, founder, honorary member, and past-president of the Society, was honorary chairman at the Founder's Luncheon in the ballroom of the Mayflower Hotel on Tuesday noon. John R. Freeman, past-president of the Society, was the presiding officer. Special medals were presented to living founders of the Society as follows: John W. Cloud, John S. Coon, Robert F. Grimshaw, Francis H. Richards, E. H. Robbins, and Ambrose Swasey. The presentation address was made by Robert L. Dougherty, vice-president, and the response was made by Ambrose Swasey.

Tuesday afteroon, the convocation for the conferring of honors was held in the National Council Chamber, with Conrad N. Lauer, vice-president of the Society, as presiding officer. Ira N. Hollis, past-president and honorary member, was chief marshal, with Kenneth H. Condit, Arthur M. Greene, Jr., Herbert L. Seward, and Roy B. Wright, members of the committee on awards, as assisting marshals. The Fiftieth Anniversary medals were presented on behalf of the Society by Conrad N. Lauer. Distinguished engineers, selected for the honor by the engineering professions of their countries, were the recipients. Each was presented for the award by the chief diplomatic officer of his native country. The Daniel Guggenheim medal was awarded for the first time to Orville Wright by William F. Durand, president of the Guggenheim Medal board. Dexter S. Kimball, a past-president, presented Fred J. Miller for the 1930 Gantt Gold Medal, which was presented by L. P. Alford, chairman of the Gantt Medal board. William LeRoy Emmet, A.S.M.E. medalist for 1929, was presented for the award by Arthur M. Greene, Jr., chairman of the Committee on Awards of the Society. Conrad N. Lauer presented the medal. Joseph Wickham Roe, Melville medallist for 1929, was presented by Arthur M. Greene, Jr., and the medal was presented by Conrad N. Lauer.

The Anniversary Dinner which concluded the formal observances was held on Tuesday evening in the ballroom of the Mayflower Hotel. William F. Durand, past-president acted as toastmaster. Charles Piez, president of the Society, gave an address on "The Broadening Responsibilities of the Engineer." Robert A. Millikan, past-president of the American Association for the Advancement of Science, surprised the audience and did not give his printed address which was to have been entitled, "The Bonds Between Science and Engineering." He used instead material from his new book.

Herbert Hoover, engineer, was presented with the first Hoover Gold Medal, founded "to commemorate the civic and humanitarian achievements of Herbert Hoover," and to be awarded hereafter for distinguished public service. The trust fund creating the award is the gift of Conrad N. Lauer. Dexter S. Kimball was the presiding officer and the address was made by J. B. W. Reynders, past-president of the American Institute of Mining and Metallurgical Engineers.

Speaking at the dinner, President Hoover, said, "I am glad to join with my fellow members in the celebration of this fiftieth anniversary of the founding of the American Society of Mechanical Engineers. It would be a difficult task to measure the blessings brought by this association through the stimulation to invention, the improvement of methods, the adequate training of engineers, and the advancement of knowledge in a large sense. During its span of life, it has contributed a great part in the development of a great art into a mighty profession, upon whose capacity and fidelity rest so much of human progress."

The "Anniversary Dinner," graced by the presence of President and Mrs. Hoover

Schultz Photo.

Fig. 1—Lathe erecting bay in the Kisha Seizo Kwaisha shop at Osaka, Japan

Building Machine Tools and Locomotives in Osaka

By Fred H. Colvin
Editor, American Machinist

OSAKA is developing into Japan's leading machine manufacturing city. Perhaps "has developed" would be more nearly correct, because so many large industries are concentrated here, and Osaka is claimed to have gone beyond Tokyo in population as well as in industry. One of the large plants building iron-working machinery is the Kisha Seizo Kwaisha which also builds locomotives, cars, and various accessories of railway rolling stock. As with all plants in a country where the demand for special products is limited, it builds a wide variety of machines, but specializes to some extent on fairly heavy machine tools of standard designs such as lathes of various types, including 80-in. wheel lathes, drilling machines, milling machines, and the like. They have also designed and built some special tools for use in railway building and repairing.

By referring to Fig. 1, some of the lathes built by the Kisha Seizo Kwaisha can be seen being erected and inspected. They are of the four-step cone variety with back gears and the usual gear train at the end. One large axle lathe that was being erected at the time of my visit had an all-geared head of substantial design and an oiling system that indicated a keen knowledge both of the needs of modern machines and of current practice. Running around the entire headstock was a good-sized oil pipe line with leads running from it to every bearing in the headstock. Oil was supplied by a pump located in a central reservoir, thus insuring all headstock bearings an ample supply of oil.

The illustration, Fig. 1, also gives an idea of the shop equipment and the way in which it is lighted from central skylights. Countershafts are suspended below the girders that support the craneway so that the crane can serve any machine tool or machine being erected in this bay. In another bay, countershafts are supported by steel structures erected for the purpose beneath the lineshaft which is supported by the craneway. This bay is given over to the making of locomotive parts. British, German, and American tools are found in this shop.

Still another bay of the Kisha Seizo Kwaisha shop is seen in Fig. 2. Here a large cast-steel locomotive frame is seen ready to be drilled, to have the pedestal jaws machined for the driving boxes and driving box wedges, and the lower ends finished for the binders that tie the

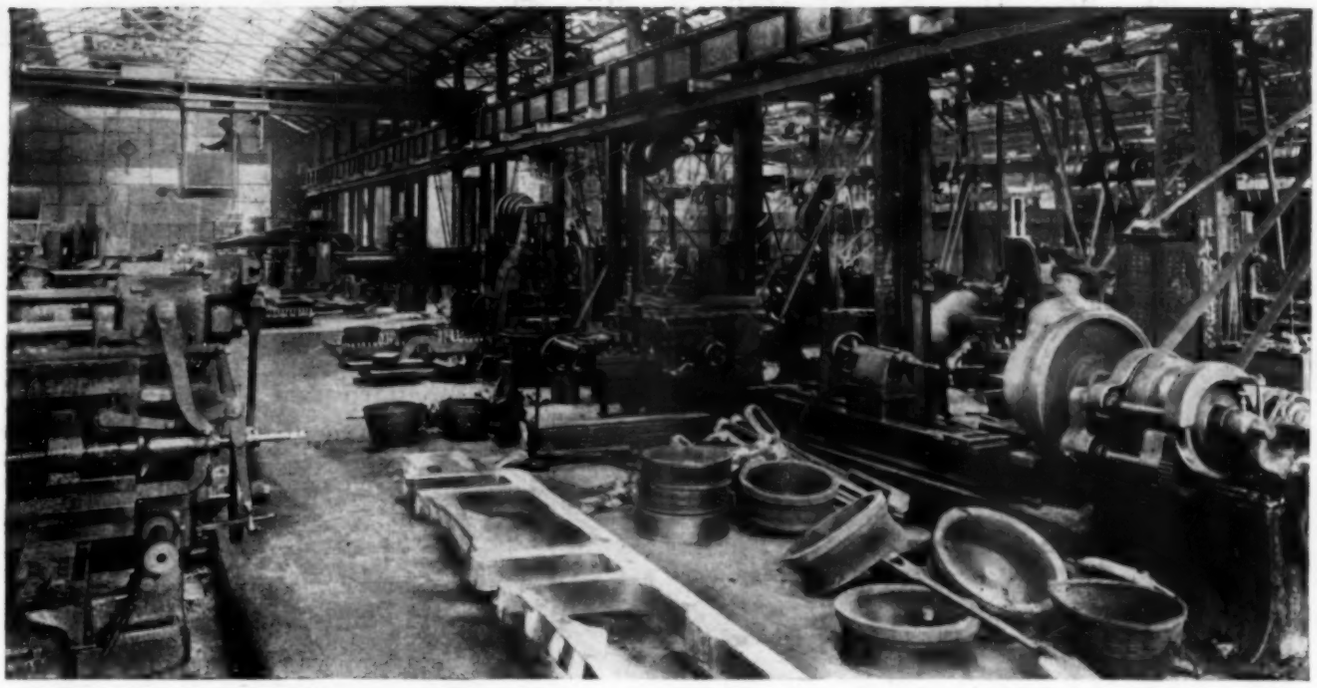


Fig. 2—A heavy machining bay where locomotive frames are handled

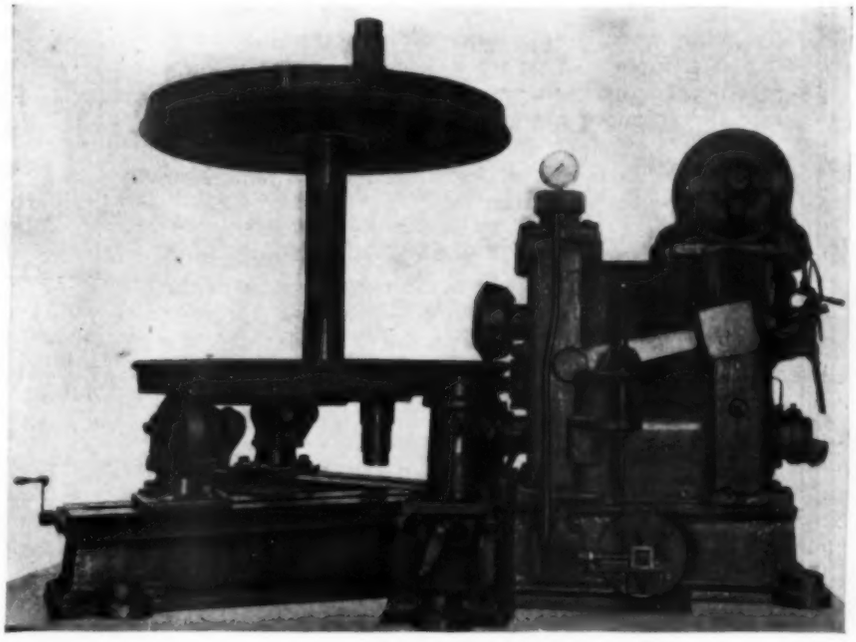


Fig. 3 — Special machine for rolling the retaining ring in place after tires are put on

lower ends of the jaws together. This shop also builds some locomotives with slab or plate frames in which the openings for driving boxes or pedestals are drilled from the solid and then finished in a slotter. Cutting the openings with a gas torch did not prove satisfactory because of the expansion and contraction throwing the frames out of alignment.

One of their special machines for railway shop use is shown in Fig. 3, this one being for the purpose of rolling the tire retaining ring into place by forcing the metal outside the ring over its edge. Here the pair of wheels is placed in the machine in a vertical position, the wheel being supported on rollers at several points. The rolling, or pressure peening, is done by the coned roller projecting from the headstock. This roller is forced down on the tire by a hydraulic cylinder beneath the pressure gage shown at the top, pressure being supplied by the pump on the base below the gage. The tire is revolved by the rollers near the head of the machine through suitable gearing, the vertical roller that bears against the tread of the tire taking the thrust due to the angle of the coned roller. The coned pressure roller is on the end of a shaft that is pivoted at the back end so that the roller moves through an arc as pressure is applied. The machine is driven by an individual motor which is not common practice in Japanese shops. This equipment illustrates the readiness with which Osaka shops are adopting improved methods.

Scrapers for Hard Steel—*Discussion*

By E. Shackleton
Johnstone, Scotland

THE article by John R. Godfrey, on page 746, Vol. 70, of the *American Machinist*, gave some practical ideas concerning the reasons for the failure of tungsten-carbide tools under some circumstances, and the makers of the new alloys would be wise to impress upon their new customers the importance of a powerful drive, a chatterless spindle, and an absolutely rigid support for the tool. At the phenomenal speeds that are used, the slightest lack of rigidity in the toolpost sets up vibrations of such a high periodicity that, although chattering may not be apparent, the tool edges disintegrate.

EXECUTIVE · FORUM

Pensions or Leaky Payrolls?

"GOOD morning, Mr. Holland." Bill Holland stopped before the information desk in the entry hall of the Eastside Machine Company. Behind the desk sat a white-haired, kindly-faced man, almost distinguished-looking in his neatly pressed blue suit.

"Good morning," replied Bill. "I know I've seen you before, but I don't recall just where. Miss Davis was at this desk the last time I was here."

"I guess these store clothes make a difference," said the old chap. "The last time you saw me, I was in overalls. My name is Pete Camp. I used to run the big boring mill just opposite the toolroom. You've passed my machine many a time when you walked through the shop with Mr. Moore. Last week Miss Davis started on a new career beginning with orange blossoms, and they brought me in here."

"Well, of course," exclaimed Bill. "And how do you like your new job?"

"First rate, sir," said Camp. "I thought it would be pretty slow at first after being in the shop so long. It isn't at all—this desk is a great place to study human nature. Besides I'm not as spry as I was forty years ago. Handling those big castings was getting to be a little too much for me."

A few minutes later Holland entered the office of Henry K. Moore, president of the Eastside Machine Company. "You've got a good information clerk out there," commented Bill after greeting his old friend.

"Yes, old Pete takes to his new job like a duck to water," said Moore smiling. "He makes a good appearance, is very courteous to visitors, and takes his responsibility very seriously. My only wish is that I had a dozen more vacant information desks."

"How is that?" asked Bill.

Moore explained, "There are a number of other men in the shop who are in the same boat as Pete—good mechanics who gave some of the best years of their lives serving this company. Now they are slowing up — beginning to interfere seriously with our production schedules. We can't turn them out, and it's only a question of time before they won't be able to make a good pretense of handling their present work. There do not seem to be enough easy berths to go around."

What Do You Think About This Executive Problem?

Provision for the industrial veteran is a question facing many concerns. Executives have come to feel that company responsibility toward faithful employees does not end with the payment of a weekly wage. Consideration of this subject must include not only what one would like to do but also a practical financial means of effecting this result.

You are invited to submit your views to the *American Machinist*. Contributions accepted will be paid for.

"The old age problem cropping up again," commented Bill. "Did you ever consider some form of pension system?"

"In a general way, yes," answered Moore. "Somehow I have always shied away from it. I do not believe the average American workman likes paternalistic activites. Another consideration is the cost. I have heard of companies inaugurating pretensious pension systems which later led into financial difficulties. Some of them had to back water, which is certainly not an enviable position to be in."

"If there is any paternalism involved, my opinion is that there is just as much in keeping an unproductive man on the job as in a pension plan. Have you ever figured how much your present solution is costing?" Holland inquired. "You keep a man in harness as long as he can carry on—then you give him lighter work until he is too old for that. Surely the slowing up of

production and delayed schedules are sizable items."

"There's no doubt about that," Moore agreed, "but these men do accomplish something. As long as they are on the payroll anyway, I believe it is better for them and the company to keep them busy here rather than send them home. The company does not tie itself up to anything that may later embarrass it."

"We're all entitled to our own viewpoint," said Holland, "but some day try to evaluate your loss through inefficient operation. Compare it with the cost of a sound, participating pension system. Look at the question from both the financial and the humane side."

DISCUSSION

OF PREVIOUS PROBLEMS

Who Should Do the Estimating?

The actual working out of estimates is a job for a trained estimator, and the foremen should not be worried with it. I have found the most satisfactory method is to work the whole thing out in detail and submit sketches or samples of individual parts together with the suggested schedule of operations to the foremen concerned for their views on: estimated time; special set-ups and tools; alteration of limits; and schedules which will reduce costs. Most foremen usually err on the liberal side, often ask for more special equipment than really necessary, and give a very liberal estimate of possible savings if their suggestions are adopted. Their suggestions are sometimes of great value, but more frequently they ignore the needs of the departments which work on subsequent operations.

It is bad practice to go to foremen before making an estimate oneself. They feel that they are doing all the actual estimating, that the estimator is a mere clerk, and they become annoyed if he ventures to hold an opinion differing from their own.

—H. J. BURNHAM,
Birmingham, England.

Should Estimates Be Given Operatives?

Estimates should be given operatives. The best plan is to subdivide every cost estimate and give each operative the actual part of the estimate that covers his work. This procedure may seem unusual, but if the right kind of men are in the shops, company secrets will not be betrayed. Many a man will work out ways and means to show up the estimate, and that certainly will be all to the good.

It has been observed that in all companies where costs are not known to the men, it is usually the case that those men are doing much poorer work than in the concerns where the men have full information regarding the business, especially that of their own department. The reason for this is quite obvious. Men are human; and to be really human means to take an interest and pride in one's work. Otherwise, the work becomes hard labor and the man is degraded to the position of a mere beast of burden. But, in order to estimate one's accomplishments, there must be some one way to measure them; so long as the cost of the job is, in a way, a measure of the success of the worker, he would naturally seek the information that would reflect the degree of his success.

—PETER DE PASQUAL, *Foreman, Kaufman Bros.*

To Whom Should the Chief Inspector Report?

Inspection should be irrevocably divorced from all other departments, and the chief inspector should report directly to the general manager. A long experience with several organizations, in which the chief inspector has reported variously to the works manager, chief engineer and the individual inspectors to the particular shop foremen, has convinced me that the system of reporting to the general manager, under which I am now working, is best.

Inspection should be permitted to function independently, with but a single duty, to inspect the specifications issued for a job. It may not at times be flattering to the judgment and common sense of an inspector to prohibit him from waiving anything in the specifications under unusual circumstances, but it is the best way in the long run. Of course, all issues need not necessarily find their way to the general manager for solution. A form, routed to the engineering and sales department, may obtain a waiver or a recommendation for acceptance despite variation from drawing or specification, but this then places the responsibility squarely where it belongs. Even in such cases, the chief inspector should retain the right of rejection, with the privilege of all concerned to request review of the general manager, whose decision should be final.

—ELI SMITH, *Engineer, Russell & Company.*

Equipment Replacement in Slack Periods

It is only natural that the executive is anxious to replace old equipment whenever the firm's finances will permit. He takes pride in his work, and although he may make certain recommendations for replacements during slack periods that could apparently be postponed, it is pretty clear to him that such replacements are essential, if the business is to continue its expansion.

The directors are sometimes interested only in a financial way. They are inclined to

get the returns on their investment, and in their anxiety to get the returns, often overlook the fact that reinvesting the profits in the business is like compounding interest on money in the bank. If the executives took the pessimistic view and waited for business to pick up before making any expenditures, there would be no pick up. Business begets business.

The firms that have gone forward in the past have been directed by men who have had the foresight to invest in new, modern equipment, that would reduce production costs as well as take care of the increased volume of business that follows. They have always been two jumps ahead of their competitors, simply because they made business conditions better for themselves. Then when there was a general pick up in business, they took more than their share, while their competitors made a frantic but futile effort to keep pace with them. We all know of many such firms. They are the leaders in industry.

—W. J. OWENS, *Foreman, Newport Rolling Mill Company.*

Does a Highly Developed System Pay?

It does not, unless the development is definitely in the direction of securing ease and simplicity in functioning. As it usually takes a profound thinker to be able to express himself simply, so into the structure of the most direct system, inspired thought and great ingenuity must be fashioned. Sometimes great complexity is necessary, indeed inevitable, if it is to do the work in the most economical and efficient manner. If only by such means can the end be achieved, the high perfection and wealth of development is indispensable. If as good working results can be obtained, however, at less cost of development, then the added refinement is just so much drag, and defeats its real objective. The acid test is the pragmatical one of how it works.

Certainly, where high development renders the system appreciably harder to work and correspondingly easier to misapply, there is the gravest need that the whole matter be once more subjected to the most searching and exacting scrutiny. A high stage of development in a system is only justified if it thereby secures greater simplicity and effectiveness.

—W. MARDY, *Stafford, England.*

To Whom Should the Chief Inspector Report?

In order to accomplish its mission of safeguarding quality, the inspection department should function as a unit, with the chief inspector reporting to the same authority as the heads of the engineering and manufacturing departments. By recognizing the importance of inspection in this practical manner, the management places quality and quantity on the same plane in the organization chart. It recognizes that in inspection, personal judgment must be exercised, and that the value of this judgment depends upon its being unhampered by influence from without.

Certain industrial plants have placed their inspection under the engineering or manufacturing divisions, with the thought in mind of cutting down overhead, only to find a great increase in cost in the assembling operations and the amount of spoiled work. The fallacy, that a separately maintained inspection department decreases production, should not be allowed to creep in. Under good management, a well-developed and meticulous inspection actually increases production, in just the same manner that a workman, after his set-up and first piece has been checked, will actually produce at a faster rate than when there is a doubt in his mind as to the quality of his work.

It is one of the primary duties of management to see that the quality of its product is safeguarded, thereby maintaining the good will of its customers. This can best be accomplished by shielding the inspectors from embarrassing influence from the engineering, manufacturing, or sales divisions, by the maintenance of a separate inspection unit, in which the personnel is carefully selected, well qualified as to mechanical experience, possessing a judicial temperament, and adaptable toward acquiring the required technique so vitally necessary. —L. J. DILLON, *Captain, U. S. Army Ordnance Department.*

Making a Manager Out of a Foreman

Surely every foreman would like to increase his income by running his department on a business basis, but I think very few men would be capable of assuming this responsibility in the sense of Mr. Wright's meaning. The reason lies in the fact that the foreman's time is fully occupied in managing production. In spite of all labor planning in the engineering department and in spite of all planning of tools, there will always be an important balance to be done by the foreman. Every production man knows that the fulfillment of this task absorbs all the efforts of a well-trained and experienced man. There is no way to get around it.

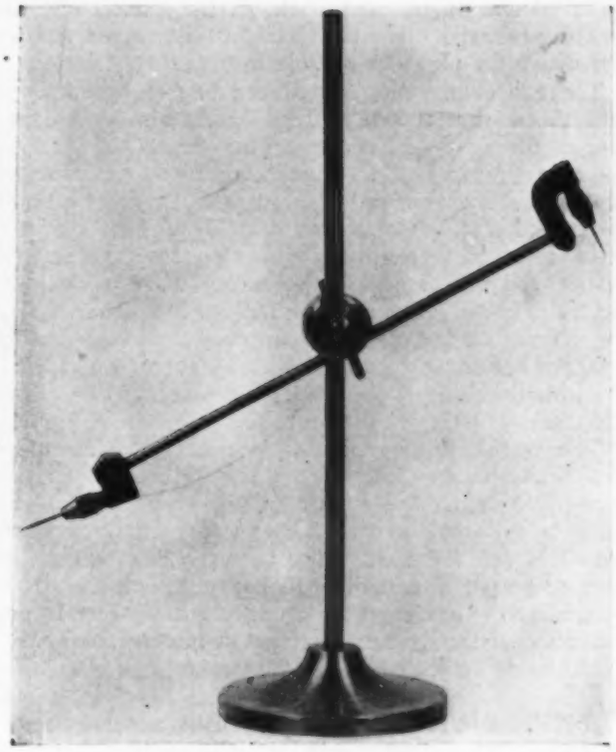
If there is an increasing demand for economy in every department of a plant, the development of the factory system has created the production engineer for that purpose. The production engineer is responsible for what the foreman can produce on a business basis. The foreman controls what actually is produced and should be held free from all other duties. Of course, the foreman must get general instructions to avoid waste in materials, tools, power, and time. But all these four main points are considerably influenced by the existing equipment and are therefore directly dependent on the management.

—FRANZ BERMANN, *Supt. Locomotive Factory, Austro-Hungarian Licensed Railway, Vienna.*

One Certain Surface Gage

By Fred Rebmann

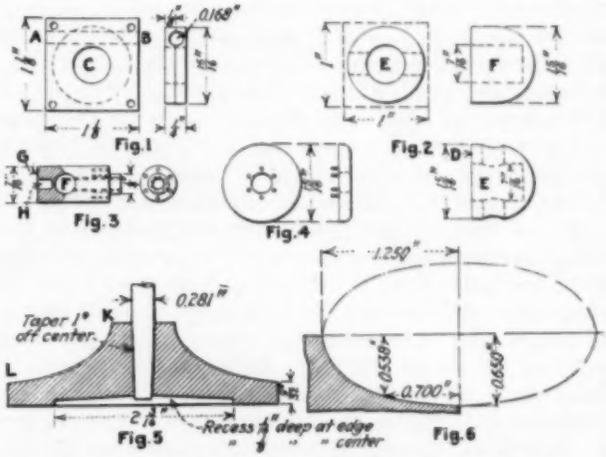
We seldom know what we want; when we do, we seldom achieve it. Ostensibly, this is a description of a surface gage. Behind it is the story of a man who wanted a certain tool and made the effort to create it in painstaking detail.



A single clamping screw and renewable needle points are among the features of this tool

A FRIEND who is a crank on mechanical matters made me a present of the surface gage illustrated above. The marking points are ordinary needles held in chucks that were taken from commercial pin vises and soft soldered to steel pieces clamped to the ends of the cross rod. This construction allows the marking points to be taken out and sharpened or to be renewed when worn out. The vertical and cross parts are drill rod, the base is cast iron, and the rest is cold rolled steel.

The washers that grasp the cross rod, he first cut out square of $\frac{1}{8}$-in. cold rolled steel, and riveted together at the corners (Fig. 1). He then drilled a hole so that half was in each piece, and this hole he finished with a rose reamer made of the same size wire as the cross rod itself. After this, it was a comparatively easy matter to lay off the center of hole C so there would be about 0.02-in. clearance between the edges of the two holes. After finishing hole C to size, the riveted corners were cut off with a hack saw and the edge of the washers turned to size.



The methods employed in machining the various gage parts reflect the maker's ingenuity and care

Fig. 2 shows three views of the clamping block with a hemispherical end. This was originally a short piece of cold rolled steel 1 in. square, which he clamped to the angle plate on the face plate of the lathe, while he faced the end D true, and bored the blind hole E a sliding fit for a piece of $\frac{7}{16}$-in. round, cold rolled steel (Fig. 3). This had been cut off previously and the ends trued to a trifle more than finished length. With this steel plug held in the hole E by a parallel clamp, he turned the work a quarter turn on the angle plate while he bored and reamed the hole F to take the vertical rod. This insured an accurate intersection of the holes E and F, permitting the plug to be assembled either side up in the clamping block and still to fit the vertical rod. After the boring operation just described, he turned off about 0.005 inch from end G of the plug and bored a blind hole H to take a piano wire spring to bear against the bottom of hole E. This spring holds the clamping block by friction at any height on the vertical rod, when the cross rod is being adjusted. He then turned up a plug in the lathe chuck to a wringing fit in hole E, and on this plug he turned the clamping block cylindrical and nearly to finished size, also roughing out the hemispherical end. By removing this block from its plug chuck and placing hole F on an arbor, he oscillated the lathe by hand and was able to use a slide rest tool to cut a semicircular arc over the hemispherical end as a guide for the finishing cut. Next he turned a plug of cold rolled steel to an easy driving fit in hole F, and sawed it off just outside of the clamping block. Then he put hole E over a freshly turned plug chuck while he turned the cylindrical part to finished size, and also hand tooled the hemi-

spherical end till the tool marks of the semicircular arc just disappeared. He then polished the outer surface and drove the plug out of hole F.

The end of the plug is reduced to ¼-in. diameter to take the washer shown in Fig. 4, and also drilled and tapped for an 8—32 screw. This screw hole reached clear through to hole F, which avoided the necessity of tapping a blind hole and allowed a long clamping screw to be used, an item of thread durability. The clamping screw is of such length that it will not quite reach the vertical rod when screwed clear home. He put six dowel pin holes in the washer shown in Fig. 5 and transferred these holes to the plug. These dowel pins allow the washers holding the cross rod to be rotated about hole E without tending to loosen the clamp screw, or to make it tighter.

The vertical rod is slightly tapered at its lower end and sticks through the base a short distance, but not enough to touch the surface plate when in use. He made it this way so that a slight tap with a hammer would loosen the stem from the base and enable the gage to be put in a shallow tool tray. Each end of the vertical rod is hardened for a very short distance to prevent its upsetting under the action of hammer blows.

WHEN it came to making the base, nothing seemed to satisfy my friend's sense of the eternal fitness of things mechanical except a quadrant of an ellipse for the shape of the curved part, as he says that curve leaves a right angle at the points K and L (Fig. 5). In order to get a close approximation to an elliptical curve, he got out his analytical geometry, and after brushing the dust off, looked up the equation of the ellipse as referred to its center and axes, which he found to be $A^2y^2+B^2x^2=A^2B^2$, where A and B are the semi-axes of the ellipse, and x and y the co-ordinates of any given point on the curve. As the lathe on which he turned this base was a bench lathe with micrometers on both feed screws, he could use this formula by letting x represent the cross slide movement and y the top slide movement, each from its respective axis of the ellipse as a starting point. By assuming certain values for x, it was not much of a job to compute the corresponding values of y; one of the assumed values of the cross slide movement from the axis was 0.700 inch, as shown in Fig. 6, while the computed value of the top slide movement for the same point on the ellipse was 0.538 inch, and so on for 28 other points on the elliptical curve, the assumed points on the curve being about ⅛ inch apart in cross slide values near point L (Fig. 5) and gradually being nearer together as point K was reached, the last few points being at intervals of only 0.010 inch of cross slide movement. This method of originating an elliptical curve gave, of course, a series of grooves cut by slide rest tool, but by skillful hand turning till these grooves just disappeared, the approximation to an elliptical quadrant was close enough to satisfy appearances.

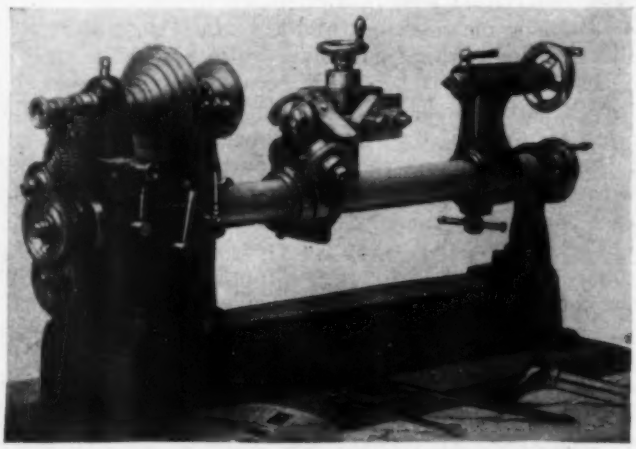
The method he used in making the washers, Fig. 1, and the rest of the outfit, insures that all parts are locked together tightly when the clamping screw is screwed up, all except the cross rod which may be rotated in the semicircular grooves in the washers by grasping the cross pin chuck in the thumb and fingers. This forms a sufficiently good leverage to overcome the friction of the small diameter of the cross rod, and herein lies the fine adjustment for height. The obliquely placed chuck puts its marking point slightly off the central line of the cross rod, so by rotating this rod, the marking point describes a small circle, and if the cross pin chuck is placed about horizontally before the gage is set approximately to height, and the clamp screw tightened, then a rotation of the cross rod in one direction will cause the marking point to rise slightly; and a rotation in the opposite direction will cause a slight lowering. My friend is undoubtedly a genuine crank on mechanical matters.

A Bench Lathe of Unusual Design

By A. P. Gwiazdowski
Ass't. Prof. of Shop Practice, University of Michigan

IN the exclusive residential section of Warsaw, Poland, I found in a two-room apartment, a graduate mechanical engineer who made a living by making bench lathes like the one shown in the illustration. His "factory" was a small bedroom equipped with a 13-in. engine lathe provided with a milling attachment, a few grinding wheels, and a 3-hp. electric motor. The proprietor was also the engineer, the production manager, the sales manager, the cashier, the machinist, and the messenger boy.

The headstock bearing of the lathe is conical, made of bronze, reamed and lapped. The bed is a cast-iron pipe, through the center of which passes the lead screw, being slotted to admit the nut. The lathe will swing 12 in. The spindle bore is ½ in. Change gears are furnished for both metric and English threads. The lathe is furnished with a milling attachment and a turret.



An unusual bench lathe

In 1921, the demand was so great for these lathes that the maker had to work from 16 to 18 hours a day, Sundays included. He refused, however, to hire additional help because he hated "slavery" and would not act as a slave driver for anyone except himself.

WHEN wet grinding is done, the piece should be absolutely wet, and not just partially wet. In other words, an adequate flood of coolant on the tool at all times while grinding will prevent checking and chipping of the tip of the tool, which is caused by starting grinding dry and then following with a dash of water. Rapidity in grinding is gained only by clean wheels. A dresser placed near the grinder will repay its cost.

Wayside Pumps in Process

How Production Methods Have Been Applied to Gasoline Pump Manufacture

PASSENGER cars and trucks, buses and taxicabs, crowd every city's streets and dot every highway. Hand in hand with the recent enormous expansion in motor transportation, has come the need of adequate service for these units. Not the least of these service demands is that of fast, accurate fueling. The motorist is on his way; he wants gasoline quickly, and he wants it measured carefully. The gasoline pump manufacturer must meet these exacting service conditions with a comparatively inexpensive product.

With the Underwriters Laboratories, state fire laws, and local Sealers of Weights and Measures to knuckle down to, his task is well hedged in with restrictions. In the event of export, foreign regulations must be met. The numerous oil companies and service station operators, which make up his customer list, have individual ideas to which his designs must conform. Some want all metal pumps, some the visible feed type; some want them hand operated, some electric motor driven; some demand the wet hose style, and some the dry hose. So it goes, through a variety of specifications capable of hundreds of combinations and variations. Color and decoration must meet individual tastes, almost endless in variety. These further complicate the problem of manufacture.

With this wide range of exactions to meet, the success with which the gasoline pump manufacturer has adopted production methods, closely paralleling those in the automotive industry, is surprising. The Gilbert & Barker Manufacturing Company is an outstanding example in this field. Their methods compare favorably with the best that other industries can boast of. They have succeeded in reducing a highly varied product to about twenty basic designs, which are of necessity subject to combination and modification. The diversity of parts does not permit tools of the strictly single-purpose type. However, the shop equipment is selected to obtain the economies of quantity production without sacrificing flexibility of operation.

Modern methods have been extended to the assembling departments, where progressive handling is employed. To exemplify the thoroughness with which quantity manufacture is utilized, a brief description is given of the steps used by Gilbert & Barker in the final assembly of one type of visible feed pump.

Preliminary to their reaching the final assembly, interior parts are painted, and exterior parts are sprayed with a priming coat. This practice permits the pumps to go directly to the paint shop for the final coats after all assembly operations have been completed.

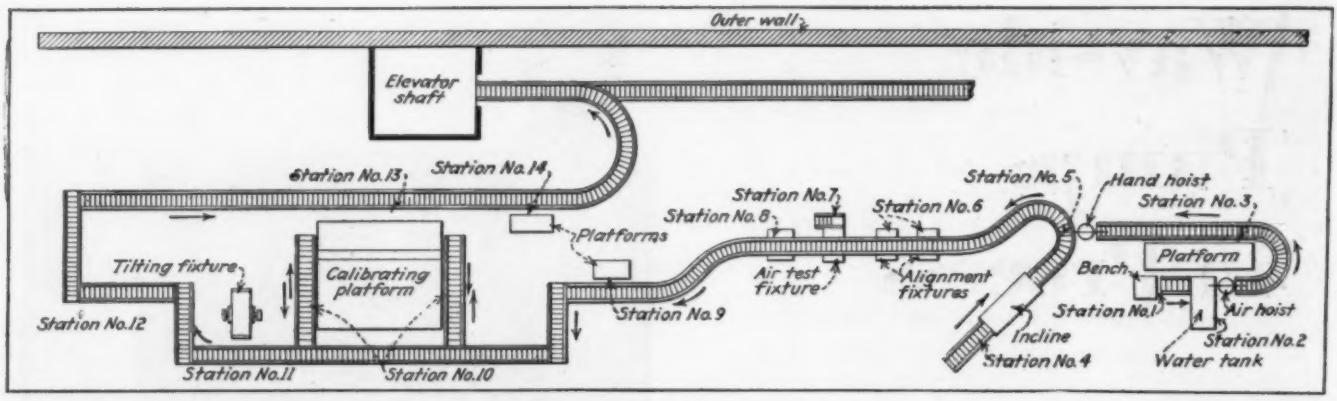
Roller conveyors are used extensively, forming the principal means of transportation in both the paint shop and assembly departments. Along these conveyors, the pumps are moved by hand through a series of work-stations. One man or a group of men perform certain specified operations at each station, adding new parts or making adjustments. Reference to the assembly floor plan will illustrate the arrangement of conveyors and the location of the work-stations for the particular line under consideration. This layout is typical of the method used for other designs.

The visible pump assembly starts with two short independent lines. Station No. 1 consists of a 30-in. high work bench at which piping is fitted to the cylinder support. These parts are then carried along a short length of conveyor to station No. 2 where they are immersed in a bath of water while air is applied. In this way, the connections are tested early in the sequence of assembly operations.

AN air hoist is used to lift the unit from the tank to a 5-ft. high, special roller conveyor with the pipes extending downward between the rails. The conveyor makes a U-turn about an elevated work platform which comprises station No. 3. The fill tube, overflow tube, sliding tube, and glass cylinder are assembled here.

While these operations are being performed, another line is starting at station No. 4. This consists of a 30-in. high roller conveyor upon which the pump, base, and rear shell are bolted together. This unit is then slid down an incline to a floor level conveyor.

At station No. 5, the two lines converge. The cylinder assembly is lifted by means of a hand hoist and combined with the base assembly. The use of this hoist enables the operators to support the cylinder at the cor-



The pumps are routed along a roller conveyor in the direction indicated; at each work station certain parts are added or certain operations preformed

rect height while bolting it to the shell. The combined units follow the conveyor along an S-curve for the next operation.

Using a special pipe-sealing compound to secure tight joints, the remaining piping is screwed into place at station No. 6. These operations are performed at one of two fixtures, which holds the cylinder support in correct alignment with the base. Up to this point, the sheet metal shell alone connects these two members; the pull of the pipe wrench would disturb their relative position were they not provided with auxiliary support. After its installation, the piping itself constitutes a rigid tie. Two fixtures are used only to gain added capacity as identical operations are performed on each.

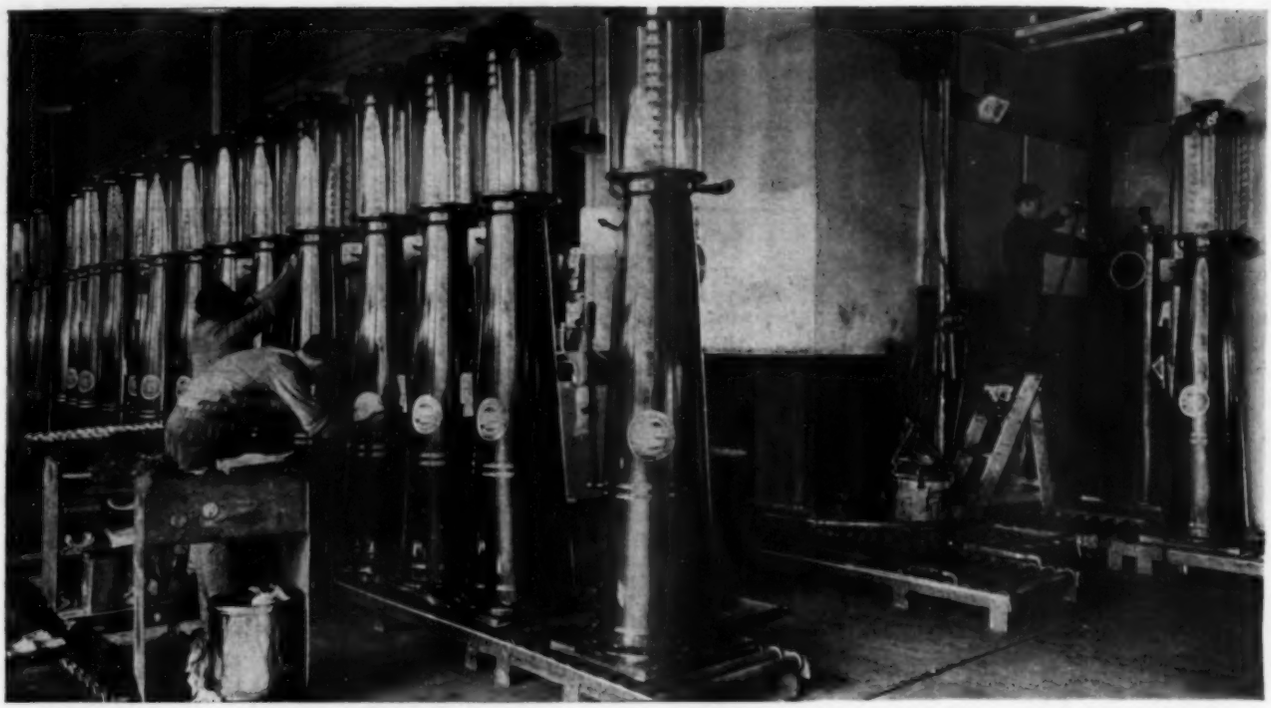
The assembly is again tested at station No. 7. The open top of the glass cylinder is covered by a rubber hood held in a special fixture. A small step ladder is provided to enable the operator to reach over the cylinder. All open pipe ends are plugged, and all joints are coated with soap suds. Any leaks which may be present are readily detected as the air is applied and are corrected.

If found satisfactory, the pump is passed to station No. 8 where the valve lever, the sliding rod, the sliding rod guide with meter, and the channel assembly with stops are added. These last two units are built up in a bench sub-assembly prior to routing to the final assembly department. An elevated work platform is provided at station No. 9, where one man installs the vacuum-breaker tube. This part, as its name indicates, permits the free flow of gasoline from the glass cylinder when the outlet valve is opened. Simultaneously with this operation, a floor man puts in place the indicator plate, the indicator rod, the lever, and the locking clip.

THE conveyor here takes a jog, and two arms extend from it at right angles. These arms pass along opposite sides of a calibration platform, station No. 10, and are arranged to accommodate two pumps apiece, making it possible to calibrate four pumps at once. The platform is approximately ten feet square. The men working on it set the markers inside the glass cylinder and then fill the cylinder with ten gallons of liquid. The men on the floor draw off the liquid, one gallon at a time, while those on the platform calibrate the markers. The floor men set the stops which control the position of the overflow valve for each gallon measured. After being correctly set, each stop is wired and sealed in position. The cans used for filling and drawing off the water conform to standard measurements and are provided with long narrow necks, and outside water gages which facilitate filling them to the proper level.

The pump is then returned to the main conveyor line and taken to station

Gallonage is carefully checked at the calibration platform. The rear of the platform is used for cleaning the cylinders and assembling the cylinder heads



Pumps are sprayed in booths immediately outside the drying oven. Decalcomanias are applied after the enamel is dry

No. 11 where any liquid remaining in the lines is drained off. This is accomplished by placing the pump in a tilting fixture which inverts it, thoroughly removing all traces of the liquid. The conveyor here takes another jog to station No. 12 which is used to assemble the conduit and front shell. Two right angle turns reverse the direction of conveyor travel. This space is used for several minor operations and adjustments.

THE rear of the calibration platform forms station No. 13. Here the glass cylinder is carefully cleaned after which the skylight and cylinder head cover are added. This completes the assembly proper. The pump then continues on to station No. 14, where it is sanded and washed, and the glass cylinder and conduit outlets covered with masking paper preparatory to painting. The pump then travels along a U-turn on the conveyor into an elevator which transports it to the paint shop on the floor above.

As noted previously, the roller conveyor method of handling is used also in the paint shop. Practically all paint operations are performed by spray guns. All exposed surfaces to be kept free from paint are protected by masking. This includes the meter faces of all metal pumps and the glass cylinders of visible feed pumps. When two or more colors are used in combination, each coat is properly covered with paper before applying the succeeding coat. A special pump enamel is used which results in a glossy, weather-resisting surface.

Between each painting operation, the pump is placed for two hours in a drying oven in which a temperature of 140 deg. Fahrenheit is maintained. Just outside each end of the oven, a spray booth is located. This arrangement facilitates the handling of pumps when several colors are used; the pumps are painted at one end, passed through the oven, masked with paper, painted at the other end, and then routed back through the oven.

After the final coat has been dried, decalcomanias are applied in accordance with customer specifications. The pump is then given a final inspection and taken to the boxing department to prepare it for shipment.

The handicap to quantity production methods, of a highly diversified product, is thus overcome. Gilbert & Barker use the method described and variations thereof to manufacture thousands of gasoline pumps yearly. The same type of manufacture has been extended to their barrel pump and tank departments.

Much of the success of the present set-up is attributed to the belief that each man in the shop knows his own job best. His suggestions are invited, and when sound, promptly accepted. "There is always a better way," is conspicuously displayed on a sign in each department.

Thus we find that an industry, which forms an important complement to the manufacture of motor vehicles, has adopted the most advanced methods that are applicable to its own problems. To these ideas have been added the original products of individual ingenuity, creating a thoroughly efficient manufacturing unit.

Two Drawers in Benches—*Discussion*

By George M. Richards
Yarnall-Waring Company

THE article in "Seen and Heard," by John R. Godfrey, page 690, Vol. 71, *American Machinist*, regarding benches and drawers, is on a much neglected and apparently insignificant subject. The placing of both of these types of equipment in most shops seems to have been a haphazard affair, with little consideration for the convenience of the workmen. Whenever it is possible, the vise should be placed directly over a bench post, facing a window, and the drawer should be on the left side of the vise, far enough away so that the handle of the vise will not prevent the opening of the drawer when the vise is at an angle of 45 deg. in that direction.

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been prepared

THE · FOREMAN'S

No Verbal Orders Accepted

"WHAT do you say we walk home tonight, Al? It isn't cold, and I've got something I want to talk over with you."

"All right Ed, suits me. But I've quit taking troubles to bed with me, for you or anybody else. Maybe you had better save it until morning."

"Not as bad as that. I'll quit when you say so."

"Shoot, then."

"Well, a peculiar thing happened this afternoon. Williams brought a small shaft into the shop, for a washing machine I think it was, and asked me turn it down on two diameters. It was for one of our customers, a 'thank you' job. I handed it to George Haney, gave him the two sizes, and told him to give it to me when he finished it."

"Yes, and I know the rest without being told. When the customer got it back, he found it was wrong."

"That's it, how did you guess?"

"I didn't have to guess. But what did you do, bawl George out?"

"No. I started to, but he swore he used the same dimensions that I gave him, and when he repeated them they sounded the same, though I did not remember them distinctly."

"Well, that leaves it up to you, Ed. Is that what worries you?"

"I'm not worried, but I am embarrassed, and so is Williams. But I don't feel that I made the mistake. I gave the directions to Haney just the way I got them from Williams, I am sure of it."

"Maybe, or even probably. But you can't throw the blame on Williams, can you?"

"I don't expect to. But there ought to be some way to avoid such trouble. I am willing to bet, if I could prove it, that the customer never gave Williams the proper dope in the first place, and still he will look to us to replace the shaft."

"Haven't we a rule somewhere that says, 'Foremen will not accept verbal orders?' Why don't that take care of it?"

"It don't, because you can't get any executive to obey his own orders. The so-called creative mind is not susceptible to system, at least, so you told me once."

"I still say so. Many intellectually big men would wreck a business in a short time if it were not for the efficiency of their subordinates. They know it is so, and expect the protection they get. Williams expects that same protection, in a measure, from his foremen. The question is, how are we going to give it to him?"

Why do perfectly logical rules fail to function?
How should the foreman protect his superior?

Contributed by Wm. J. Owens, Foreman, Newport Rolling Mill Company

Foremen are invited to discuss these questions vital to their work; of course the

ROUND · TABLE

DISCUSSION OF EARLIER TOPICS

Learning from the Small Shop

FROM the standpoint of cost alone, the relationship between tool cost and the cost of performing an operation, based on present and prospective quantity requirements, should be such as to effect a minimum total cost per piece. The shop should be the sole judge as to what methods to use to secure this end.

However, in addition to the matter of cost, the degree of accuracy is usually a factor, and sometimes also the question of interchangeability. The engineering department must set limits in these respects, and the method of manufacture by the shop must be governed accordingly, considerations of cost notwithstanding.

The shop, then, given the objective of manufacturing at the lowest possible cost consistent with the necessary degree of refinement, should certainly take advantage of small-shop methods or pick-up tooling, if by so doing that objective can best be met.

—WM. C. LANDIS, *Superintendent. Westinghouse Air Brake Company.*

*

Smoking During Working Hours

I HAVE been a cigarette smoker for 20 years and nobody enjoys a smoke, especially when trying to concentrate or when nervous, better than I. Yet, I have always been an exponent of the "No Smoking" rule, even when I was an apprentice in the toolroom. It is not only a fire hazard, and the cause of considerable lost time, but it certainly does not do any man's health good to smoke while at work. As we all know, smoking is harmful in a way, and it is sometimes a good thing not to be able to smoke at will. For example, most men on a day off smoke continuously, and as a result they are lethargic and have no "pep." As to officials and men in the office smoking: absolutely no. Why should they be an exception to the rule? Certainly the fire hazard is greater with all the paper around, and as most men cannot smoke and work efficiently at the same time it is a time loss to the employer. I am employed by a company whose no smoking rule applies all the way from the top executive to the smallest man in the organization, and it works out fine.

—CHARLES R. WHITEHOUSE, *Chief Time Study, The Holtzer-Cabot Electric Company.*

Should the Workman Share Responsibility?

IT WAS a pretty tough break for Ed's best man to get fired for doing what he apparently thought was right. Like Ed I feel, sometimes, that my best men should use better judgment and not spoil their work. However, I am not as drastic with them as Ed is. I have been through it many times and unless I can see willful disobedience, I find other ways to penalize a man. I have laid men off for shearing dies at the press, and mechanics for laying out and machining their work wrong, telling them at the time, that I was laying them off for a week to let us both have a chance to think it over.

While the man is out, I see if anything can be done to salvage the spoiled parts and prevent such incidents in the future. It is usually just another case of the foreman not checking the first piece done or making more frequent contact with the worker.

—CHARLES H. WILLEY, *Asst. Plant Supt., Hoyt Electrical Works.*

*

Compulsory Membership in the Mutual Aid

IT IS quite a common thing in this country to sign an agreement form on commencing work with a new firm. This form binds the applicant to contribute towards the mutual aid and any other club the employees maintain. In one plant the writer is acquainted with, not once in the course of seven years has a signature been lacking. By this means a substantial balance has always been in hand to meet a sudden demand for an unforeseen series of accidents.

The distribution of the benefits by this society has always been done by a committee chosen from among the subscribers, and the names of recipients were known only to the officials themselves.

—C. A. POORE, *Surrey, England.*

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Who Shall Be Laid Off First?

A WORKMAN'S ability should be the first consideration, length of service second, and size of family last. While I place length of service as second, it is a very important factor. The older employee should always be given preference.

The size of a workman's family is a personal matter that would put a good many companies out of business if they based their lay-offs on it. I am in favor of giving a married man the job and of laying off the single man if their abilities are equal.

While I believe all business should be run with a "feeling" for the workmen and their families, and that their interest should be considered at all times, circumstances alter cases. Sound business judgment should rule on the whole.

—C. A. HAYS.

VEXING as is this question of whom to lay off, I believe there is a logical answer to the problem. Naturally, the better men get the higher pay, but in the inevitable lag of pay increase and slumping off of some

discussion is not limited to foremen. Letters accepted and published will be paid for

of the men, pay is not always the current unit of measurement of value. I would group the men under each rate of pay, and then assign in each group an arbitrary unit of efficiency, giving the best man in each pay group the highest mark, the next best the next highest mark, etc. I would establish for each group an arbitrary mark, to which all marks assigned must average, in order to get a reasonable distribution of such marks. Then I would assign some mark for each year of service, in order to reward loyalty. This I would add to the efficiency mark in each case, and then do my weeding out uniformly in all pay groups, taking the necessary number of lower marked men in each group. The factor of size of family I would ignore as being beyond the scope of my official jurisdiction. In this way, I believe I would act in the fairest way to the men, and at the same time retain the best balanced organization.

—B. E. LAMBERT, *Design Draughtsman, U. S. Naval Aircraft Factory, Philadelphia.*

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Who Shall Be Laid Off First?

AS SECRETARY of a works' committee the writer was once called upon to assist in the following circumstances:

A depression had caused a serious falling off of orders. This meant either a serious curtailment in the number of employees, or alternatively, short time, there being only sufficient work for keeping on about half the personnel for full time, or the whole for half time.

The works' committee was called together and the position explained to them. The result of the conference was the adoption of short time, for it was recognized that there were many advantages in that course, for example:

1. Partial employment is better than none.
2. All share in the benefits of what employment there is.
3. It overcomes the dispiriting effect of enforced idleness.
4. Men in pivotal positions and mechanics trained to particular operations are retained.
5. The spirit of co-operation and good will is strengthened in both employer and employee.

Today, that firm has reason to be glad that it acted as it did. Unquestionably, every effort should be made to retain the services of the trained employee.

—J. W. PEPPERDINE, *Peterboro, Ontario.*

*

Smoking During Working Hours

I DO NOT think much of any office man who comes into the shop smoking when he knows it is against the rules. If he is not big enough to see this for himself, he should be told about it, and if the infraction is repeated, he should be disciplined. All shop employees realize that the office folk have different rules and more privileges. They accept that fact when they work in the shop. But to have someone come into the shop and "show off" is likely to bring about the result which Ed complained of.

Shop men should be under discipline at all times. So should office men. Each should adhere to the letter and spirit of the rules laid down by the management. Respect and loyalty grow out of just firmness.

I can see no excuse for a smoking period. In some classes of work a rest period may be necessary, but surely not for the mere opportunity to smoke. Shop men are generally on a production basis, and do not have the time to loaf on the job as do the office men. —H. STILES.

*

New Drills and Old Men

MANY machines are manufactured on the street corner downtown; many are made in buses or street cars; much criticism is made in like places, and many threats also.

But all in all, the man doing this means no harm; he is usually a good workman and he just hasn't anything better to talk about. I have seen new machinery come into different factories, which couldn't possibly be effective according to "old timers," and in one month's time these same old timers were boosting this same equipment, especially if they had the opportunity to operate it.

Shopmen naturally comment on improvements in the factory. It is usually in the form of adverse criticism and seldom in praise. Let it be what it may, their criticism can do no harm, and they do seem to get a big "kick" out of it.

Put Bill on the new drill press; he will operate it, and in less than a month will pride himself on being fortunate enough to be delegated for the position.

—W. F. OBERST, *Assistant Superintendent, Grinell Washing Machine Co.*

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Raising the Working Efficiency

NO MAN worth his salt finishes his schooling when he discards his school satchel. This applies particularly to engineers, and more particularly engineers in charge of others.

A foreman not only must continue to learn, he must learn to teach. It is his job to raise the efficiency of his men by prompting and directing. The dictum, "advice is cheap," does not hold here. The foreman's advice must be based on experience, sympathy, a knowledge of material and processes, and particularly, a knowledge of men.

What is true for operatives generally, and for foremen in particular, is no less true for designers, salesmen, and for managers. Indeed, the higher the position, the wider the scope covered, and the influence wielded, so much greater is the need to continue seeking knowledge and applying it. —W. ROLAND NEEDHAM, *Stafford, England.*

* * * *

THE · NEXT · TOPIC

"Spring Song"

A PLUS Incentive to High Production

By F. Trevor Daniel,
B. Sc. Eng., A. M. I. Mech. E., Sydney, N. S. W., Australia

IT IS NOT always fully realized that the worth of a wage incentive system is dependent on the overhead rate or burden as well as on the value of the finished product. As a general proposition, it may be stated that the higher the overhead, the greater the necessity for providing liberal wage incentives to gain the maximum production efficiency. Conversely, with lower overhead, there is less need for applying costly time study methods and specialized tooling to the work.

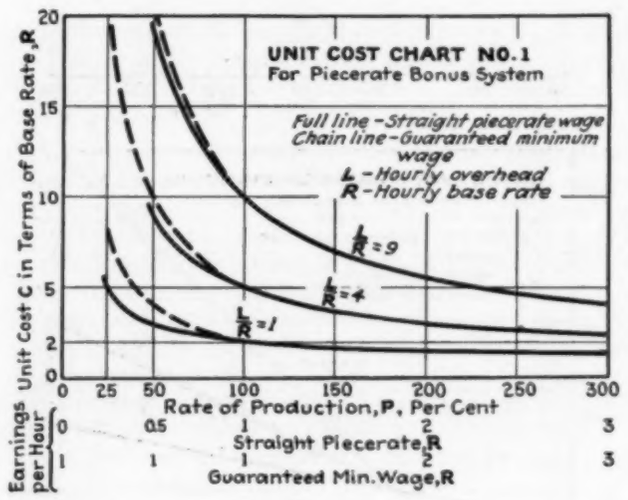
To demonstrate these statements graphically, Chart No. 1 has been prepared. The variation of unit costs is shown in relative production and overhead rate. The horizontal scale represents the per cent of production from 0 to 300 where 100% is the set standard; the vertical scale represents unit costs in terms of hourly wage rate.

This chart is based on the formula:

$$C = \frac{L + PR}{P}$$

Where: C = Unit cost L = Hourly overhead
R = Hourly wage scale P = Rate of production.

The formula as it stands is on the basis of straight piece work. If a minimum hourly rate is guaranteed, the value PR will have a lower limit equal to R. Otherwise, the formula remains the same.


UNIT COST CHART NO.1
For Piecerate Bonus System
Full line - Straight piecerate wage
Chain line - Guaranteed minimum wage
L - Hourly overhead
R - Hourly base rate
L/R = 9
L/R = 4
L/R = 1
Unit Cost C in Terms of Base Rate, R
Rate of Production, P, Per Cent
Earnings per Hour
Straight Piecerate, R
Guaranteed Min. Wage, R

An inspection of the chart will show that with the maximum assumed overhead, $\left(\frac{L}{R} = 9\right)$, the unit cost is $19R$ at 50% production, $10R$ at 100% production and $5.5R$ at 200% production. Assuming the minimum overhead $\left(\frac{L}{R} = 1\right)$, the unit cost at 50% is 3 R, at 100%, 2 R and at 200%, 1.5 R. A guaranteed minimum wage results in still higher unit costs at below par production.

This chart may be used to determine whether or not it is advantageous to do a particular job on a machine carrying a high overhead rate. For example, assume that a certain operation may be performed at a 100% production rate on a machine carrying a 4 R overhead. The rate of production would have to be increased to 225% on a machine having a $9R$ overhead to retain the same unit cost. If either method showed performance better than this, its employment would be profitable. The figures used are extreme in order to magnify the results for purposes of illustration.

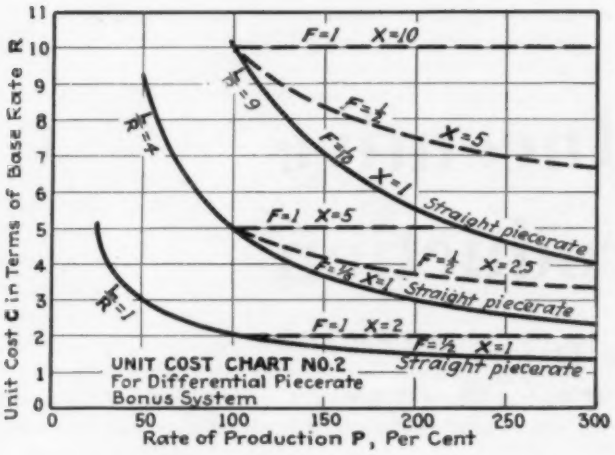
It is evident from the Chart No. 1, that with higher overhead rates, the value of improved performance is increased. Therefore, the effort to gain efficient production should be proportional to the overhead. If with a 100% overhead, it pays the management to use a straight piecework system, it is advantageous on high overhead jobs to offer a still more generous bonus. Accelerated production, even neglecting the reduction in unit cost, is a decided advantage, in that is permits shorter deliveries, quicker turnover of material, and obtains greater plant capacity for the same investment. Recognition of these important facts is stressed in the various bonus and efficiency methods now in use; none of these, however, establishes a scientific and exact relation between wage incentives and overhead charges.

Let us examine the problem as to how the bonus inducement can be logically determined from the overhead load. Considering, first, cases where output is below the set 100% standard, and no hourly wage is guaranteed—it is probably best to base the pay rate on straight piece work. For production over 100%, the incentive should be provided in proportion to the necessity for cost reduction, and be so calculated that it is definitely related to the unit cost irrespective of the overhead.

Let X be a factor representing the ratio between the incentive offered and rate of production increase. Then, for the stipulated conditions to hold, X is a function of $(L + R)$

$$\text{or } X = F_1\,(L + R) = F\left(\frac{L}{R} + 1\right)$$

The value of F depends on how much of the cost



saving, including both labor and overhead charges, the management desires to offer as incentive to the operation. If all such savings are to be available as a premium, F will equal 1 and X becomes $\left(\frac{L}{R}+1\right)$. At the opposite end of the scale, if the operator is to receive no premium, F and X become zero, and the remuneration remains at a straight hourly rate. Intermediate values of F divide the savings, resulting from bettering the 100% production rate, between the management and the operator. For example, the choice of $F = \frac{1}{4}$ means the $\frac{1}{4}$ of the total saving will be offered as a bonus, and $F = \frac{1}{2}$, that the saving will be shared equally by the management and operator. Choosing a low value for F will result in a small extra incentive which will arouse little enthusiasm in the shop for cost reduction. Conversely, a liberal value, towards unity, will provide an extremely valuable inducement; where the overhead is high, it will yield the greatest benefit to both parties to the bargain.

Chart No. 2 shows the relation between unit cost, production, and overhead, plotted as in Chart No. 1, and in addition, the modification of these curves by applying various values of F. These curves are based on the formula:

$$C = \frac{L + R + XR\,(P-1)}{P}$$

Since: $X = F\left(\frac{L}{R}+1\right)$

$$C = \frac{L + R + F\left(\frac{L}{R}+1\right) R\,(P-1)}{P}$$

$$= \frac{L + R + F\,(L+R)\,(P-1)}{P}$$

$$= \frac{(L+R)\,(1+FP-F)}{P}$$

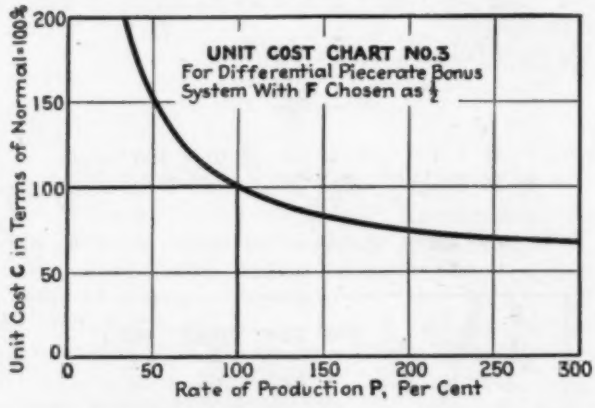
It may be noted from the formula as simplified that, if $(L + R)$ is given a fixed value such as unity, C is expressed in terms of F and P. Consequently, for any selected value of F, a curve may be plotted showing the relation between unit cost and production for any value of $(L + R)$.

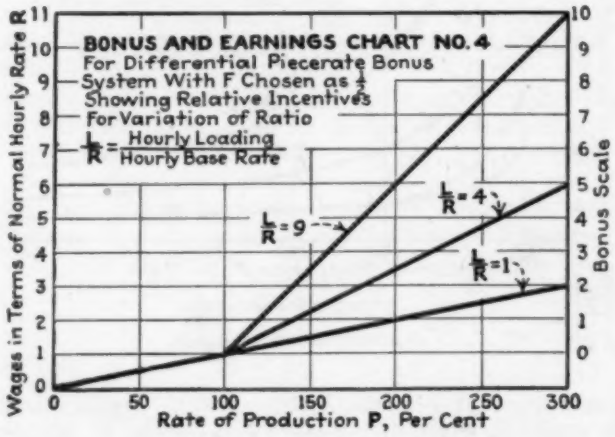
Chart No. 3 shows such a curve where $F = \frac{1}{2}$, $(L + R) = 100\%$, and the unit cost is given as a percentage for various rates of production. Thus the management can, at any time, institute a clear-cut bonus system, designed to give definite costs at certain rates of production. Such a system should automatically instill far-reaching economies as a habit of the operating personnel. Needless to say, that such a system would have to be safeguarded against any action that would cause the operators to become suspicious of rate cutting as they would then hang back to a "safe limit" of production.

In order to illustrate the wage rate and bonus scale in terms of production, the curves on Chart No. 4 were plotted. It is again assumed that $F = \frac{1}{2}$. Wages and bonus rates are shown in terms of R, the hourly base rate, for three different overhead ratios.

In conclusion, let us examine the probable advantages accruing to the management having the courage to install this system and the employees working under it:

1. The company makes better use of its plant and capital.
2. It obtains quicker deliveries and turnover.
3. Employees gain in available earnings.
4. Over-normal production is attained.
5. Operators would be eager to transfer to high-overhead processes, and for this reason, would cultivate efficiency.
6. The management would be able to employ selective transfer, thus placing the best employees in the positions where their increased efforts will give best results.
7. Relatively inefficient operators being confined to the low-overhead processes cannot cause as much havoc in the cost by falling down on production.
8. Forecasting of cost in relation to production may be performed more accurately than where bonuses bear no relation to the overhead rates.


UNIT COST CHART NO.3
For Differential Piecerate Bonus
System With F Chosen as ½
Unit Cost C in Terms of Normal=100%
Rate of Production P, Per Cent


BONUS AND EARNINGS CHART NO. 4
For Differential Piecerate Bonus
System With F Chosen as ½
Showing Relative Incentives
For Variation of Ratio
L/R = Hourly Loading / Hourly Base Rate
L/R=9
L/R=4
L/R=1
Wages in Terms of Normal Hourly Rate R
Bonus Scale
Rate of Production P, Per Cent

Editor's Note: The author advocates a wage incentive system which is at variance with accepted methods. He contends that the machine operator should share in overhead savings as well as in labor savings.

· BOOK · REVIEWS ·

PSYCHOLOGY FOR EXECUTIVES. *By Elliott Dunlap Smith. Published by Harper & Brothers, 49 East 33 St., New York, N. Y. Two hundred sixty-two pages, 5¼x7⅞ in. Indexed and appendixed. Cloth bound. Price $3.50.*

PSYCHOLOGY, stripped of its high-sounding phrases and presented as the group of co-ordinated truisms that it is, so that any executive may understand and profit, is this volume by a division manager of the Dennison Manufacturing Company. It is a study of human nature in industry, one of the best it has been our privilege to examine. The answers to such practical questions as: How can psychology be taught to executives? How do you train people to better working habits? How do you handle department quarrels? What do you do with disgruntled subordinates? What is the best way to get groups to act together, and similar ones grow out of the author's active experience as an executive and as a teacher of foremen and executive training courses.

The book is not only a sound introduction to psychology, it is an application of it, with numerous typical industrial illustrations of actual factory, store, and office problems and their solution. Typical chapters are: Why Men Are What They Are, Habits and How to Handle Them, Habit and Thought, The Forces of the Personality, The Problem of Self-Control, The Effect of the Group in Industry, and The Integration of Conflict. Two appendices give suggestions for studying and teaching practical psychology and a list of good books on the subject. This is a volume not only for the foreman desirous of improving his relations with his men and with his superiors, but also for executives, no matter how much or how little psychology they have had previously.

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INTRODUCTION TO BUSINESS MANAGEMENT. *By Herbert G. Stockwell. Two hundred eighty pages, 6x9 in. Published by Harper & Brothers, 49 East 33rd Street, New York, N. Y.*

AS ITS title states, this book is an introduction to business management. It does not attempt to give rules, lay out systems, or suggest methods of management. It simply defines business, and outlines the mental qualifications that are necessary to conduct one successfully. It devotes a chapter to the subject of scientific thinking, and then passes on to review the different forms of business ownership, and how each is organized. Next, it deals with the organization of the different types of business and the officers and personnel necessary to each. Bonus incentives and profit sharing plans are described, business ethics outlined, and the value of personality emphasized.

Aside from its concluding chapter, which gives instructions as to accumulating management information, the book is entirely descriptive and for that reason should be valuable to all who aspire to executive position, and to executives who desire an outline of business management, free from descriptions of management systems or personal bias.

ELECTROPLATING WITH CHROMIUM, COPPER, AND NICKEL. *By Benjamin Freeman and Frederick G. Hoppe. Two hundred twelve pages, 6x9 in. Cloth board covers. Published by Prentice-Hall, Inc., 70 Fifth Avenue, New York, N. Y. Price $5.*

THERE are few up-to-date plating books on the market, and very little assembled data on chromium plating, so that this volume, by two capable men of the National Chromium Corporation, seems to fill a direct need. In spite of two or three evident weaknesses, it contains very good specific information on cleaning, polishing, and plating. The illustrations are poor, and a large proportion of space has been given to the restatement of well-known principles previously available.

Although the matter of injury to workmen by chromic acid baths has been given much publicity lately, and much data has been made available by the U. S. Bureau of Public Health and the Bureau of Standards, no mention is made of this point nor is any of the modern equipment for chromium plating shown. This is surprising in view of the fact that such information is available from the authors' own company. The subject of arrangement of the plating and polishing departments for production has also been slighted. The book may be considered as a very good treatise on the electro-chemical technique of plating in these metals, but is not a complete or general book on the subject of chromium plating.

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SCIENTIFIC MANAGEMENT IN AMERICAN INDUSTRY. *Edited by H. S. Person. Four hundred seventy-nine pages, 6¼x9¼ in. Cloth board covers. Indexed. Published by Harper & Brothers, 49 East 33rd St., New York, N. Y. Price $6.*

FOR anyone who is looking for a thorough, analytical study of the whole subject of scientific management compressed into one volume, this book should be valuable. The fact that it tends to idealize what Frederick Taylor is credited with doing, and does not distinguish between what he actually did and a natural evolution of the industrial age, does not lessen the value of the book.

The book was written by selected members of The Taylor Society, which includes a number of men in high positions in a wide variety of industries. It is divided into six parts and 29 chapters. Beginning with a study of the origin, nature, and influence of scientific management, it takes up progressively and interestingly the subjects of management, research, management standards for office and factory, control of various operations and standards, and the human aspects of management. It contains 90 illustrations, largely typical charts and forms. The frequent reference notations form a valuable feature of the book.

*

AN EXAMINATION OF EARNINGS IN CERTAIN STANDARD MACHINE TOOL OCCUPATIONS IN PHILADELPHIA. This book, which contains 85 9x6-in. pages, has been written by H. Larue Frain of the Wharton School of Finance and Commerce of the University of Pennsylvania, Philadelphia. It is the fifth of a series of research studies. Dr. Frain has confined his analysis of earnings in a selected group of standard machine tool occupations to the relations of certain variables to money wages, but his findings should prove of interest to employers throughout the industry. Price of book, $1.50.

EUROPE ALSO EXPORTS

League of Nations statistics showing the competition America faces in foreign machine tool business

By F. M. MANSFIELD
Paris Correspondent

TABLES of statistics compiled by the Economic Section of the League of Nations to show the distribution as well as the value of European machinery and tools among the chief European countries, will be of interest to the American machine tool exporter, affording him a fairly clear picture of the amount of competition he has to meet. The figures here presented are complete only as far as they go. They do not take into consideration exchanges of minor bulk and value, but they do show the relative proportions of those exchanges which are of importance. Figures are for 1928 exports.

The exports of Germany are by far the greatest. Great Britain, France, Italy, and Switzerland follow, together with Austria, Hungary and Czechoslovakia.

These figures assume that the chief exports referred to were production machinery of some nature required in the rebuilding of the industrial structure of Europe. As such they are pertinent and convincing.

Although the League's statistics clearly show that the foreign competition for American machine tools is by no means so negligible as it was a few years ago, American exports to many European countries are still increasing. Indeed, the growing automobile industry of Europe is demanding of America machines which, for the most part, it cannot get elsewhere at present. The fact is not to be ignored, however, that the machinery producing countries of Europe are, if not catching up, at least cutting in.

The law of diminishing returns will inevitably work against further American progress if its influence is not met by counteraction of some sort. It may be denied that a "tariff holiday" is of itself a good thing for the world at large, but if the United States of Europe, which after all will probably never mean much more than a customs union of some limited sort, is anything more than a myth, the "most favored nation" principle must be adhered to by all with whom the United States has trading relations. Else, a barrier of trade will be set up which may be insurmountable. This is not for today, but it may be for tomorrow.

AUSTRIA

Value in schillings. Schilling equals..... $.1407

To	Electrical Goods		Tools, Cutlery, Other Iron and Steel Manfrs.
Germany	11,793,000	.....	23,463,000
Belgium	853,000	.....	752,000
France	.....	.....	1,236,000
Great Britain	4,259,000	.....	.....
Hungary	8,002,000	.....	10,294,000
Italy	5,091,000	.....	8,937,000
Holland	1,950,000	.....	.....
Poland	21,450,000	.....	12,961,000
Switzerland	.....	.....	4,686,000
Czechoslovakia	13,999,000	.....	17,647,000
Yugoslavia	15,758,000	.....	.....

BELGIUM

Values in Belgian francs. Franc equals..... $.028

Germany	.....	.....	§288,000,000
Austria	2,200,000	.....	.....
France	175,000,000	.....	.....
Great Britain	109,000,000	.....	.....
Hungary	§§1,344,000	.....	(1927) 1,676,000
Italy	31,000,000	.....	.....
Holland	167,000,000	.....	.....
Poland	2,500,000	.....	†3,800,000
Dantzig	.....	.....	1,800,000
Switzerland	36,000,000	.....	49,000,000
Czechoslovakia	(1927) 4,700,000	.....	.....
Yugoslavia	600,000	.....	†14,600,000
			2,500,000

§Semi-products. §§Automobiles. †Fire arms and parts (1927).

CZECHOSLOVAKIA

Values in Cz. Crowns. Cz. Crown equals.... $.296

Yugoslavia	Machines and parts	48,000,000

FRANCE

Values in French francs. Franc equals..... $.039

Germany	176,000,000	.....	219,000,000
Austria	§5,000,000	.....	.....
Belgium	361,000,000	.....	270,000,000
Great Britain	(Trade was less than 180 million francs)		
Hungary	§6,900,000	.....	.....
Italy	114,000,000	.....	46,000,000
Holland	(Trade was less than 35 million francs)		
Poland	27,000,000	.....	†10,000,000
Switzerland	94,000,000	.....	.....
Czechoslovakia	§13,400,000	.....	3,200,000
Yugoslavia	6,100,000	.....	†10,100,000
	§5,900,000		
	§§17,700,000		

§Automobiles (1927). §§Airplanes and parts. †Fire arms.

GERMANY

Value in marks. Mark equals..... $.2382

To	Machinery	Electrical Goods	Tools, Cutlery, Other Iron and Steel Manfrs.
Austria	45,200,000	16,200,000	25,100,000
Belgium	40,100,000	.....	24,400,000
France	78,700,000	22,600,000	27,700,000
Great Britain	58,900,000	.....	49,400,000
Hungary	18,600,000	6,500,000	9,600,000
Holland	82,000,000	.....	85,900,000
Italy	60,000,000	24,400,000	32,000,000
Poland	64,000,000	16,000,000	15,500,000
Dantzig	12,700,000	.....	7,500,000
Switzerland	46,000,000	13,600,000	34,600,000
Yugoslavia	24,400,000	6,000,000	15,800,000
Czechoslovakia	65,500,000	14,600,000	23,800,000

GREAT BRITAIN

Values in Sterling. Pound Sterling equals $4.8665

Germany	1,755,000	*898,000	1,063,000
Austria	86,000	.....	*41,000
Belgium	1,386,000	*122,000	1,234,000
France	2,180,000	*250,000	972,000
Hungary	64,000	.....	.....
Italy	1,111,000	356,000	927,000
Holland	2,395,000	242,000	1,782,000
Poland	744,000	*19,000	148,000
Switzerland	234,000	*72,000	*164,000
Czechoslovakia	285,000	.....	.....
Yugoslavia	101,000	.....	*8,000

*Figures supplied by Bureau of Foreign and Domestic Commerce, Washington.

HOLLAND

Value in florins. Florin equals..... $.402

Germany	Tools and appliances	10,028,000
Austria	Tools and appliances	807,000
Belgium	Tools and appliances	4,690,000
France	Tools and appliances	5,305,000
Hungary	Tools and appliances	609,000
Italy	Tools and appliances	3,201,000
Poland	Tools and appliances	1,151,000
Switzerland	Tools and appliances	1,253,000
Czechoslovakia	Tools and appliances	1,297,000
Yugoslavia	Tools and appliances	133,000

HUNGARY

Value in pengos. Pengo equals..... $.19295

Germany	.....	2,357,000	.....
Austria	.....	.....	.....
Belgium	.....	462,000	.....
France	†1,260,000	375,000	.....
Great Britain	(Trade was less than 300,000 pengos)		
Italy	.....	1,800,000	.....
Holland	.....	290,000	.....
Poland	877,000	1,000,000	.....
Switzerland	(Trade was less than 1,000,000 pengos)		
Czechoslovakia	(Trade was less than 3,000,000 pengos)		
Yugoslavia	8,338,000	2,485,000	‡2,621,000

†Agricultural machinery. ‡Railway rolling stock.

ITALY

Value in lire. Lire equals..... $.526

In spite of an important machine production, exports do not bulk in value and therefore have little effect on the proportions of the machine tool trade as set forth with respect to other European countries.

Germany	Automobiles	45,000,000
France	Automobiles	37,000,000
Hungary	Automobiles	8,400,000
Holland	Automobiles	6,100,000
Poland	Automobiles	10,500,000
	Railway cars	50,500,000
	Airplanes	2,000,000
Switzerland	Automobiles	16,000,000
Czechoslovakia	Automobiles	8,100,000
Yugoslavia	Machinery	4,700,000

POLAND

Value in zlotys. Zloty equals..... $.112

Yugoslavia	Textile machinery	200,000
	"Machines pour l'industrie textile"	544,000

SWITZERLAND

Value in Swiss francs. Franc equals..... $.193

Germany	Machinery	31,579,000
Austria	Machinery	4,875,000
Belgium	Machinery	8,827,000
France	Machinery	20,662,000
Great Britain	Machinery	17,986,000
		1,734,000
Hungary	Electric locomotive	533,000
Italy	Machinery	15,929,000
	Instrum., etc., and appliances	2,979,000
Holland	Machines	5,380,000
Poland	Stationary motors	1,324,000
	Instrument and appliances	2,405,000
	Machines	9,073,000
Czechoslovakia	Machines	5,792,000
Yugoslavia	Machines	796,000
	Stationary motors	583,000
	Instruments and appliances	455,000

How Much Junk Is Under Your Benches?

By Henry C. Francis

BURIED treasure has lured many to spend hours at hard labor digging for pieces-of-eight or other valuables, usually with small reward. Digging out accumulated tools and accessories from under the benches of old shops is much less alluring, but more profitable in every way. For even if the loot is only worth its scrap value it is better to get it out of the way.

Old tools that were hidden under work benches in a small shop

Few realize how much accumulation can be found in the average shop, especially if the shop has been in business a number of years. An excellent example of what can be unearthed in many shops is seen in the accompanying illustration, and this is only about one-third of the total excavations. Milling cutters, drill jigs, stamping dies, and a variety of other things make up the lot.

Not many of these tools are worth salvaging, and will be disposed of as scrap. At present the collection presents a good object lesson as to what should not be done. If there is an accumulation of old tools or materials of any kind under the benches of the shop, the sooner they are dug out the better. These were found when the new management of one New England shop got on the job. Needless to say it will not happen again.

IDEAS FROM PRACTICAL MEN

The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Beeswax for Self-Equalizing Fixtures

BY D. A. BAKER

PARTS such as the one shown at *A* in Fig. 1, made of cold-rolled steel, while quite simple in themselves, being merely slotted through where shown by the finish marks, usually present quite a problem to the tool designer who seeks a rapid and economical method of holding and machining them. One of the most common ways of holding parts of this nature is in vise jaws similar to those shown at *B*. The disadvantage of this method, however, is that but two pieces can be held satisfactorily; the slightest difference in diameter of a third piece is sufficient to cause one of the others to become loose in the jaws, thus endangering the wrecking of the cutter.

Another trouble that would probably be experienced in the use of such jaws is that the parts might close in on the cutter when they have been partly sawed through. Several types of fixtures have been designed for holding parts of the kind shown, but they usually have a number of clamps, each clamp holding two parts only, and these of necessity spaced some distance apart. Therefore, such fixtures are not as rapid in operation as they might be.

The fixtures shown in the illustrations overcome all the difficulties mentioned above, as they permit the holding of any number of parts simultaneously, and with very little separation of the parts. If properly made, they are practically foolproof and have nothing to get out of order, except through actual wear or abuse.

One type of fixture, now in use by a prominent manufacturer of airplane engines, is shown in Fig. 1. The holding part of the fixture is a rectangular steel bar having a number of holes in which the parts to be machined are placed. After it has been loaded, the bar is slid into the fixture proper. The slot through the center is wide enough and deep enough to clear the cutter to be used, while in holes directly under those in which the parts are placed, are plungers, held in place by pins but having a limited endwise movement.

The fixture proper consists of a cast-iron base, attached to which are two steel strips *C* that act as guides and hold-downs for the work-holding bar. In a slot below are two steel wedges, the upper one being held against endwise movement by stop plates, but free to move up or down. The lower wedge is free to move endwise, its motion being controlled by an adjusting screw threaded through a plate attached to the base. Closely fitted in holes in the upper wedge, are steel plungers in alignment with the plungers in the work holder. These plunger holes open into a hole drilled at right angles to them and lengthwise of the wedge. This hole is filled with beeswax and is closed at its outer end by a pipe plug.

In operation, the parts to be machined are placed in the holes in the holding bar, and the bar is slid into the fixture. The lower wedge is forced forward by operating the adjusting screw, raising the upper wedge, the plungers in which strike the plungers in the holding bar,

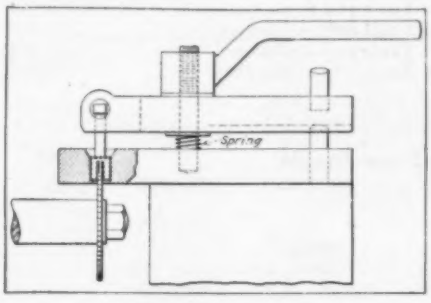


Fig. 2—Fixture in which the plungers are operated by a clamp

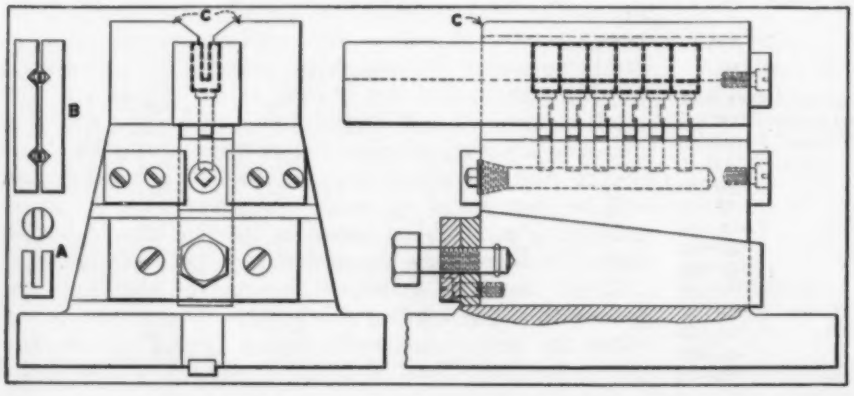


Fig. 1—In this fixture the clamping plungers are operated by a wedge

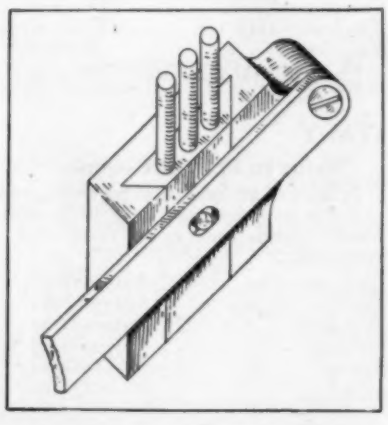


Fig. 3—Attachment for stripping and burring the work

forcing them up until they bind the parts to be machined against the hold-down strips. Any variation in the lengths of the parts is taken care of by the resilience of the beeswax against which the lower ends of the plungers in the wedge rest.

Another fixture adapted either to such parts, or to parts of a similar nature, is shown in Fig. 2. This fixture consists of a cast-iron base on top of which is a hardened and ground steel plate having a number of holes to take the parts to be machined. Plungers backed by beeswax, as in the first fixture, are carried in a clamp plate operated by a handled nut. The clamp plate is slotted to clear its stud, so that when it has been released it can be pulled back clear of the holes, allowing parts to be placed or removed.

In slotting parts of the kind described, burrs made by the cutter will tend to make difficult their removal from the work holders. For high-speed production, it is advisable to design some form of hand-operated knockout. For use with the fixture shown in Fig. 2, I have generally used the device illustrated in Fig. 3. It is attached to a plate clamped to the face of the machine column. The device consists of a cast-iron or steel body, a slide, and a lever. In the top of the slide are mounted a number of pins corresponding to the number of parts held in the fixture, and spaced the same as the holes in the holding member.

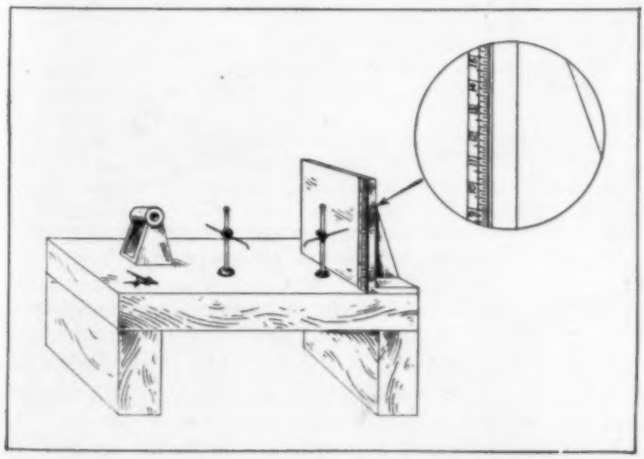
The device is arranged so that when the table is run back far enough for the work to clear the cutter, the pins will line up with the parts, a suitable table stop being provided. By operating the lever, the pins will push the parts out of the holding member, shearing off the burrs.

While this article gives but two applications of the use of beeswax as applied to the equalization of clamps, once the clever tool designer has seen such fixtures in operation, he will readily appreciate the advantages of the principle involved and will find many uses for it.

Simplifying Laying Out

By F. S. Doughty
Leeds, England

A simple addition to the laying-out table is shown in the illustration. It consists of an ordinary flat scale attached near one edge of an angle plate, which is ordinarily an adjunct to the laying-out table. The length of the scale is a matter of the height of the angle plate and the class of work generally dealt with. In use, its evident time saving is when the scriber in the scribe block has to be frequently changed from one dimension to another.



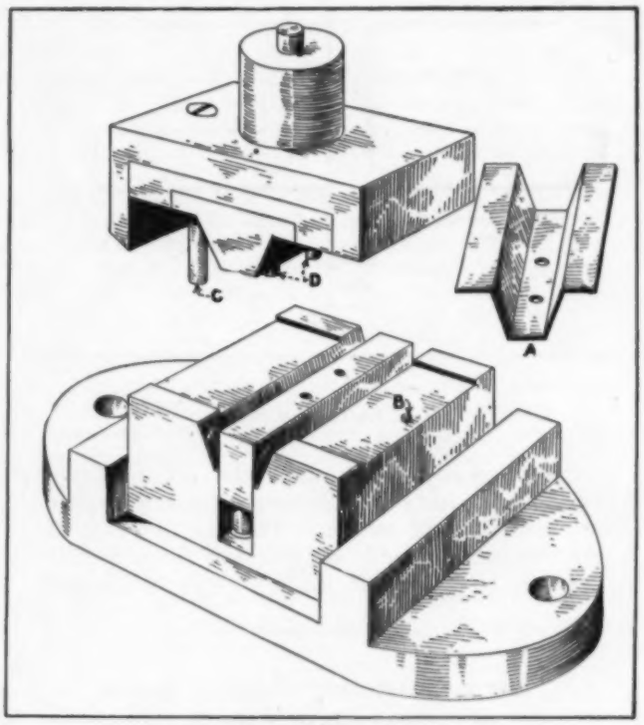
A simple addition to the laying-out table

The arrangement is shown in place on the table. With practice, tedious work in setting the scriber can be overcome.

Press Tools for Cutting Off, Piercing, and Forming

By Charles H. Willey
Asst. Plant Supt., Hoyt Electrical Works

Pieces such as the one shown at *A* were being made by hand in small quantities, the cutting being done in foot-power shears, and the bending by the usual hand methods. The holes were drilled. The work was slow and costly, but we did not feel like going to the expense of tooling up for it. However, we received an order for 5,000 pieces and had the toolroom make the punch and die shown in the illustration, using some old parts of discarded punches and dies, such as the punch shank and the die base.



Cutting off, piercing, and forming tools

The pieces were made from $1\frac{1}{2} \times \frac{1}{32}$-in. soft brass, which was fed to the die through guides to the stop pin *B*. As the ram descended, the pressure pin *C* gripped the stock and the shear cut it off. At approximately the same time, the two punches *D* pierced the piece, the resistance to the movable section of the die by the pressure plate being great enough to permit the two $\frac{3}{16}$-in. punches to do their work before it started downward. Continued downward movement of the ram forced down the movable section of the die, allowing the forming punch to form the piece.

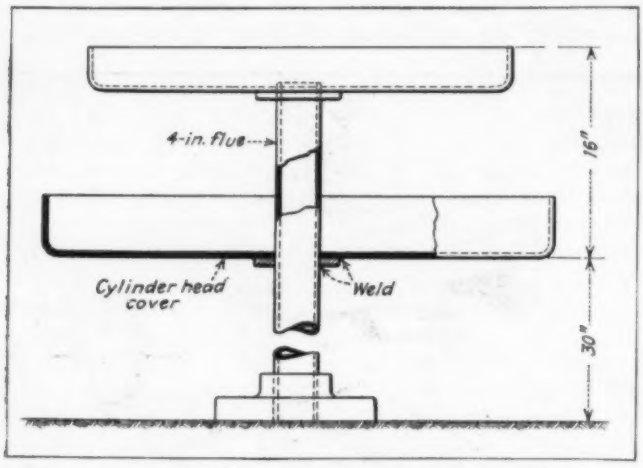
As the ram ascended, the knockout pin attached to the forming stripper stripped the finished piece. The saving

on 5,000 pieces paid for the tools and left us quite a profit, figuring on the cost of the pieces made by hand. Besides, we are now in position to take care of repeat orders.

Convenient Rack Made From Discarded Parts

By C. W. Frank

During a recent visit to a railroad shop, I noticed a rather handy form of rack that had been made from discarded parts of locomotives. The design is shown in the illustration. The center column is a piece of



A rack for the railway shop

4-in. flue obtained from an old boiler. The shelves are cylinder-head covers of different sizes, supported by collars welded to the column. The base is a pipe flange. It provides means for bolting the rack to the floor. The rack can be made with as many shelves as required.

An Emergency Repair for a Threaded Arbor

By Charles C. Tomney

Tool Designer, Brunswick-Kroeschell Company

Some time ago, while repairing a work-holding fixture, the threaded arbor shown at *A* in the illustration had to be duplicated. A piece of steel suitable for the replacement was not available in the emergency, the only piece on hand being a piece of $1\frac{3}{16}$ in. diameter, which would not give the shoulder shown at *B*. There is no twisting strain on the shoulder, the fixture being used in a shaper with the thrust of the cutting tool parallel to the axis of the arbor.

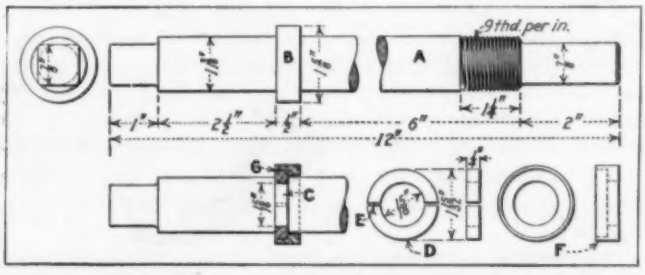


Fig. 1—An emergency repair for a threaded arbor

The $1\frac{3}{16}$-in. steel was used, being roughed out to leave about 0.010 in. for finishing. A groove $\frac{1}{4}$ in. wide and $\frac{1}{8}$ in. deep was cut as shown at *C*. The steel ring *D*, with an inside diameter the same as that of the bottom of the groove, in this case $1\frac{5}{16}$ in., and an outside diameter of $1\frac{13}{32}$ in. was made and split as at *E*. Another ring, *F*, turned to $1\frac{3}{32}$ in. outside diameter and $\frac{17}{32}$ in. width was made with a small hole large enough to slide over the roughed-out arbor and a counterbored portion $\frac{17}{64}$ in. deep and a diameter which was a shrink fit over the outside diameter of the split ring.

In assembly, the ring *F* was simply shrunk over the split ring after it had been placed in the groove as at *G*, The arbor was then finished in the usual manner.

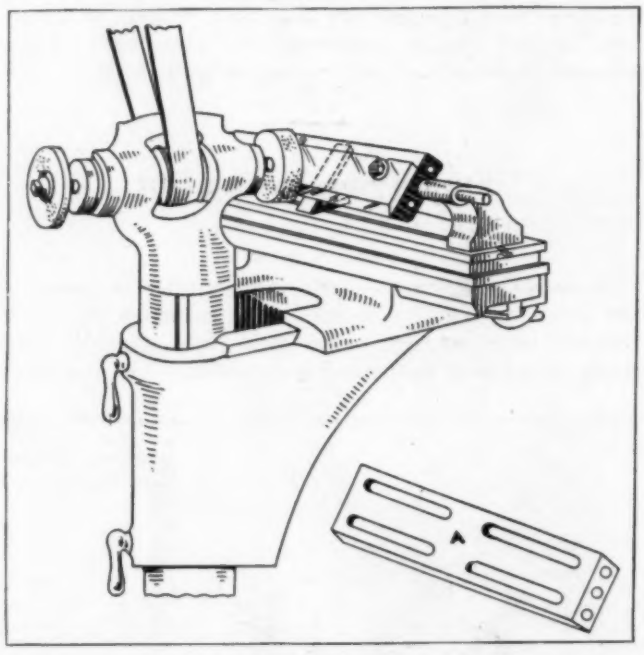
This sort of repair is permanent as well as comparatively rapid when welding is not available. The shoulder might have been made by simply shrinking the ring over the shaft itself, but would possibly not have been as solid or as lasting.

An Adapter for a Grinder

By J. H. Boyd

Melbourne, Australia

Cutter and reamer grinders can be set up for jobs other than are provided for in the equipment generally furnished with them. I have in mind the grinding of flat, angular work. Work clamped on a slotted plate, such



Adapter for grinding angular work

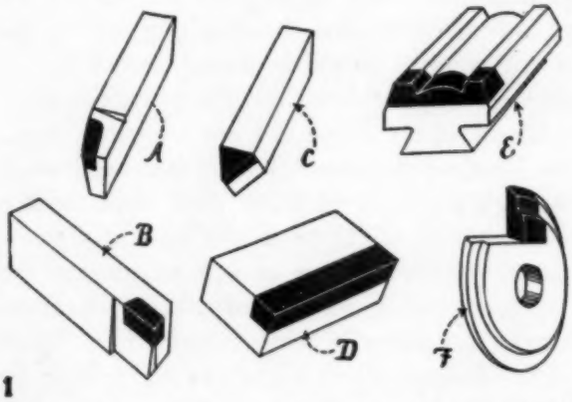
as the one shown at *A* in the illustration, can be ground to any desired angle by holding the plate between the centers of the machine, as shown. The plate can be set at any angle by the addition of a graduated attachment, and can be held in position by very simple clamps. By a proper attachment, a magnetic chuck can be held in the same manner.

Grinding Tungsten-Carbide Tools

CEMENTED tungsten carbide comes between nine and ten on the Mohs scale of hardness, that is, it scratches sapphire and commercial aluminous abrasives, and is in turn scratched by diamond. It is much too hard to be touched by any known metal, and must, therefore, be formed and finished by grinding, honing, or lapping. Since it is costly, only small amounts should be removed per grind; therefore, original wheel cost must be subordinated to grinding performance.

Crowding a tungsten-carbide tool against a grinding wheel only causes waste of the tool material, injury to the tool tip, and glazing of the wheel. Tools may be ground either wet or dry, but it should be either one or the other. If dry, periodical cooling of the tool shank is necessary—the tip must not be quenched or the material will check and crack. If wet, a flood of coolant should be applied at all times. When grinding is light or only a small amount of the tool is to be removed, dry grinding is recommended; for production work with a skillful operator, wet grinding enables him to turn out more work, but also requires a harder wheel.

The proper pressure for free-hand grinding is that which is a little short of gouging the periphery of a 46-80 grain wheel. For "fixed" surface grinding, the direct feed should depend upon the crossfeed. If the feed is straight in, without cross feed, 0.0005 in. per cycle of two passes is good practice. If a cross feed of 0.030 in. per

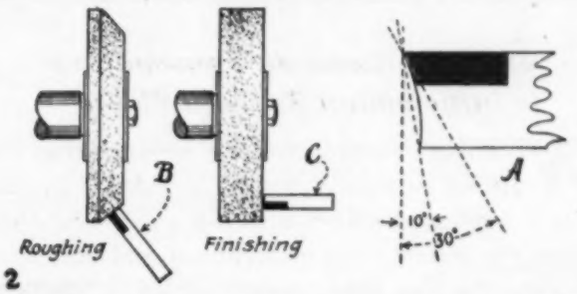


1

pass is used on roughing, a direct feed of about 0.003 in. per pass is best.

Either a diamond or a dresser, preferably the latter, should be used in dressing. The diamond dresser has a tendency to dull the abrasive, but is necessary if the wheel is to be formed.

A representative group of tools is illustrated in Fig. 1. Hand grinding is satisfactory for tools of form *A;* the top rake, however, may be finished on a surface grinder and the front and side rakes on a pedestal grinder. When surface ground, the top rake should not be ground when the tool is redressed, for if it is ground too often, the tool tip soon becomes too thin for service and the tool is useless. Tools of the types shown in *B, C,* and *D* may be ground either wet or dry on a surface grinder, holding them with a universal vise. The form tool at *E* is also a surface-grinding operation, the wheel being formed with a diamond. The tool may be ground a section at a



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time without harm. Similar procedure is required for the circular form tool *F*, handled on a cylindrical grinding machine. In both cases, of course, the top face is the one retouched in redressing.

In redressing lathe and boring-mill tools on a pedestal grinder, the cutting edges can be roughed on the wheel periphery, then finished on the side so that the angular faces will be straight rather than concave. The dished edge is not objectionable if the cutting edge is not affected as at *A*, Fig. 2. The wheel can be dressed at a 45-deg. angle, as at *B*, to give a satisfactory surface, the finish grinding being done as at *C* on the side of the wheel. A large cup wheel with a straight side is preferred, however.

Roughing of tungsten-carbide tools should be done on a 60- or 80-grain wheel; finishing on a 100- to 120-grain one. Grinding of boring-mill type tools should be done so that the wheel cuts away from the cutting edge, to prevent chipping of the tip. Wheel speed is usually not critical, except for safety. Approximately 4,000 to 6,000 ft. per min. is recommended. It is desirable to keep the wheel fairly true in order to secure maximum time of contact, but on work where absolute accuracy is not required, a slight out-of-round condition may be a good sign. It is evidence of the wear necessary to keep the wheel sharp. Chatter marks are quite common when rough grinding is approved practice.

Lapping and honing are performed on the ground tool to improve appearance, to secure accuracy, and to refine the cutting edge. A slightly chipped cutting edge, as left by grinding, has been found to be less durable than one more finely finished, and not nearly so productive of good results. Lapping is done on the sides of revolving disks of cast iron, aluminum, brass, copper, or similar material. Areas lapped are limited usually to flat surfaces. In one shop, a 11½-in. disk runs at 1,800 r.p.m. In other places, speeds are lower. The work is held in various ways. Silicon carbide, boron carbide, and diamond powder are the abrasives used. The abrasive is mixed with a vehicle, such as water, kerosene, lubricating oil, olive oil, or almond oil, and spread on the disk. The thinner vehicles are used on machines which circulate the mixture, but most lapping is done without circulation, and the finest finish is obtained by wearing down an application of abrasive mixture after it is spread on the disk.

Silicon carbide and boron carbide are economical for rapid removal of material. Diamond dust, though faster cutting, is more expensive, and boron carbide costs several times as much as that of silicon. The carbides are more inclined to leave a cloudy surface, but the edge is keen. Diamond dust leaves a polished, but slightly lined, surface with a keen edge.

Drawings from "Carboloy"

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

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Modern Means of Transmitting Information Between Plants

WHERE a manufacturing organization has grown to such size that it includes several widely separated plants working on similar operations the interchange of technical and operating information has been something of a problem. Words are not always adequate, even when supplemented by blueprints or photographs, to describe clearly an intricate production operation. Even when they are it is not always easy to find the man who can put them together properly.

But the inexpensive domestic sixteen-millimeter movie film has proved to be an entirely satisfactory medium for imparting such information. Several large corporations are already completely equipped to exchange operating details by means of the movie camera and projector, and their experience has been more than satisfactory.

In one case, where the old method of a lengthy typed description illustrated by some seventy-five dollars worth of still photographs was used, nothing but confusion and arguments resulted. A fifteen-dollar movie film of the same operation gave so clear a picture of what was involved in the operation that no argument was possible.

Some of us may have questioned the value of the motion picture for anything outside of amusement, but here is evidence of its usefulness that we cannot refute. Not only is it better, but it is far cheaper.

*

The June Crop

WITHIN two months from now will be available the June crop of young and eager engineers. Though, according to statistics, they bud not as prolifically as graduates of agricultural colleges and bachelors of arts and philosophy, many graduates of technical schools and colleges will be detaching themselves from parent stems to drop into the laps of dozens of industries.

Once upon a time young and eager graduates peddled their diplomas and degrees from door to door until, sensing the general unreasoning antipathy toward technically trained men and forced sometimes by actual hunger, they jettisoned their academic honors and took the first jobs open.

Now, however, the situation is vastly changed. It would seem, indeed, that the more successful and more far-sighted the industry, the greater will be its effort to secure the pick of each June crop. Thus it would seem that any industry that is not already systematically adding youthful, enthusiastic, trained intelligence to its staff may readily see one reason why some of the more far-sighted industries are more successful. And it would seem also that its executives would get into immediate touch with carefully chosen technical schools to secure the pick of this year's June crop.

*

Human Engineering

IF BY reason of some major cataclysm, the Detroit River should overflow its banks, as did the Mississippi some time ago, and cut off over one hundred thousand families from their livelihood, the American Red Cross and many another relief agency would take the field with customary promptness. And, as with the Mississippi and its periodical outbreaks, the best engineering brains of the country would be brought to bear on the problem of preventing recurrent tragedies.

The Detroit River did not overflow, but over one hundred thousand Detroit families have been, through no fault of their own, dependent upon local charity all through the past winter. And almost as devastating as a flood, unemployment has been taking its toll of vitality, health, and human happiness in centers other than Detroit as well. Though there are not really reliable figures available, segregating unemployment into "technological," seasonal, habitual, and other classifications, the plain fact stands that more or less general unemployment does come upon the United States with a disheartening periodicity. More power, then, to those pioneers in human engineering, like the Survey Associates, who are doing their level best to measure unemployment quantitatively, to search out its underlying causes, and to find sound remedies. That unemployment is becoming increasingly recognized as an evil, a preventable evil like tuberculosis and not an "Act of God," lends strength to the growing conviction among industrialists and operatives that it can be minimized if not entirely banished.

SHOP EQUIPMENT NEWS

Manville No. 370-D "New Model" High-Speed Capscrew Trimmers

HEADS of capscrew blanks may be trimmed hex, square, or round at a rate of 145 blanks per minute on the No. 370-D automatic cap screw trimmer announced by the E. J. Manville Machine Company, Waterbury, Conn. From a tool maintenance standpoint, however, this speed is somewhat high, and in consequence, 125 blanks per minute is considered a desirable rate of operation. The machine itself will stand a higher rate of speed, but the tools developed until the present time show greater efficiency at the recommended rate.

Capscrew Sizes Handled

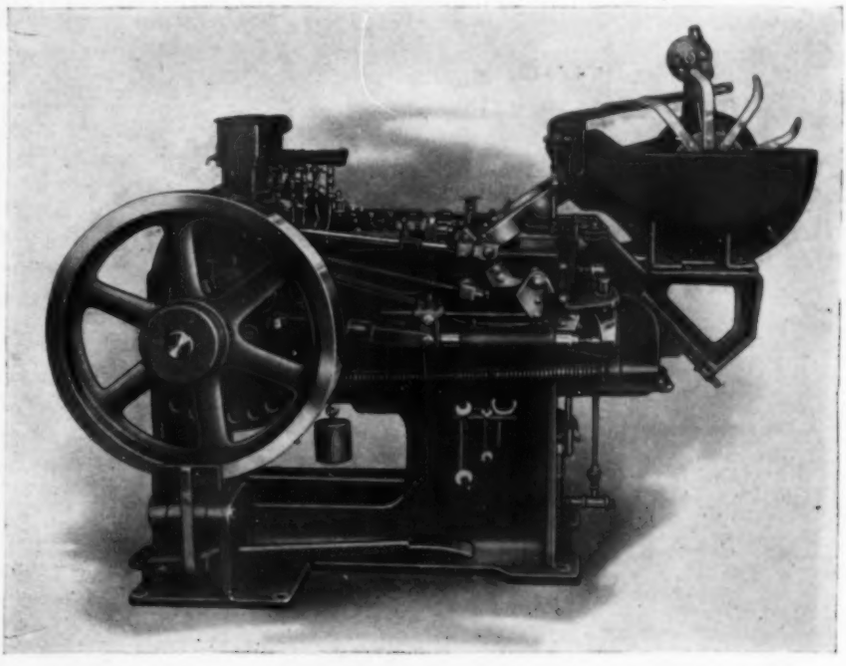
This capscrew trimmer will handle $\frac{3}{8}$-, $\frac{7}{16}$-, and $\frac{1}{2}$-in. capscrews not exceeding $2\frac{1}{2}$ in. in length. One operator can look after a much larger battery of these machines than of the $\frac{3}{4}$ x $4\frac{1}{2}$-in. bolt head trimmers, and the machine itself requires less floor space and less horsepower.

As will be observed from the illustration, the machine is of the conventional horizontal type, and is constructed on a one-piece base, which provides a rigid support for the frame and all of its high-speed mechanism. The reciprocating motion of the trimming ram has sufficient dwell to afford a knockout or kicker mechanism sufficient time to eject the blank through the trimming die. As the blanks are presented between the trimming die and punch, a cam-actuated pusher mechanism, carried in the reciprocating trimming ram, advances ahead of the positive movement of the trimming die and ram, thus forcing the body of the blank into the trimming punch. During the interval of dwell, and while the die and punch are practically on dead center, the blank kicker or knockout mechanism ejects or kicks the blank through the trimming die in the reciprocating ram and into a delivery chute on the right side of the machine. It also separates the scrap from the trimmed blank.

Carried in the reciprocating trimming ram is a cam-acuated, friction blank pusher, which advances ahead of the trimming die and against the head of the screw blank, pushing the body through the transfer fingers and into the trimming punch. As the fingers move upward, this blank pusher drops out of the way just as the trimming die engages the head of the blank. This blank pusher is recommended for trimming blanks with body lengths of $1\frac{1}{4}$ in. and shorter. For $1\frac{3}{8}$ in. and longer blanks, the blank pusher is not required and may be disconnected easily.

In connection with the trimming blank, there is provided a very simple arrangement for installing the extruding die back of the trimming punch for trimming and extruding.

Motor drive is ordinarily furnished with this machine and a motor platen is attached to the rear of the frame for carrying a 3-hp., 900 r.p.m. motor. The net weight of the machine is about 3,500 lb. and the floor space is 42 in. from side to side by 61 in. from front to back, without the motor.



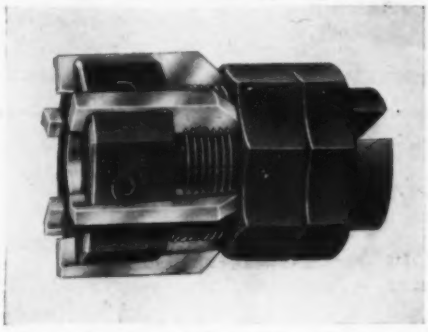
Manville No. 370-D "New Model" High-Speed Capscrew Trimmer, which is recommended for operation at 125 blanks per minute

Davis Type L Expansion Reamer

A reamer radially relieved on the diameter has been brought out by the Davis Boring Tool Company, 6200 Maple Ave., St. Louis, Mo. The reamer body is of high-carbon nickel steel, heat-treated for toughness to resist torsional strain. Regular blades are made of high speed steel, but Stellite or other materials can be furnished. All blades are locked from the front, taking the cutting thrust against the back and bottom of the slot, thus giving a full metal-to-metal bearing at the thrust points. This construction gives rigidity and eliminates the tendency to chatter caused by a rocking blade. Because of the extra long travel of the ad-

justing nuts, 50 per cent of the blade may be ground away before it is necessary to replace the blade. Only six sizes of blades are required to cover the entire range of bores from 1½ to 6 inches.

Spiral bladed reamers, either right or left hand, carry a 10-deg. spiral angle. This angle has been proved to be the most desirable and is a departure from the usual 5-deg. angle. All parts are made to standards that afford interchangeability. The reamer as a whole may be incorporated into any type of tooling for special requirements. The shell type has an arbor hole with ⅛-in. taper per foot, but a straight hole can be furnished if desired. Shanked models are fitted with straight shanks, tapered shanks, and guide sleeves. The reamer portion of every style reamer is identical with the shell type and all blades are interchangeable within the specified size group.

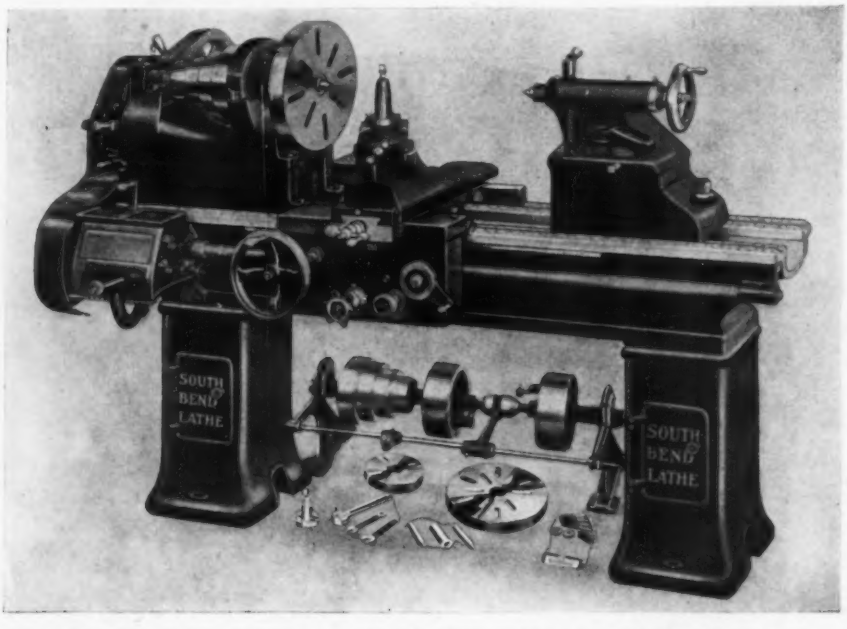


Davis Type L Expansion Reamer

South Bend "New Model" 16 to 24-In. Lathe

DESIGNED for machining work of large diameter on which only light cuts are taken, a 16 to 24-in. "New Model" lathe has been placed on the market by the South Bend Lathe Works, 426 East Madison St., South Bend, Ind. This lathe is a regular 16-in. type fitted with raising blocks to increase the swing from 16¼ to 24¼ in. over the bed. The raising blocks are firmly fitted under the headstock, tailstock, and compound rest. It will be noted that the compound-rest raising block is graduated on the base so that the tool can be fed to the work at any angle. It is fitted with automatic cross and longitudinal feeds and is especially built for the cutting of screw threads.

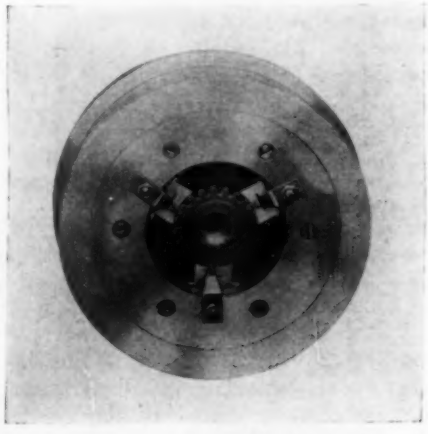
By using a special form of turning tool, a flywheel 24 in. in diameter can be machined on its face. A roll 16 in. in diameter can be machined between centers for its entire length, as a roll of that size will swing over the saddle. The 16-in. lathe may be fitted with lathe chucks, drill chucks, and other attachments, which make possible a large variety of work. It can also be supplied with countershaft drive or silent chain motor drive, and can be had in any bed length from 6 to 12 feet.



South Bend "New Model" 16 to 24-Inch Lathe, which is equipped with raising blocks to increase the swing from 16¼ to 24¼ inches over the bed

Bolender No. 3 Gear Grinding Chuck

A No. 3 size has been added to the line of Bolender gear grinding chucks manufactured by the City Machine & Tool Works, East Third St. at June Ave., Dayton, Ohio. The features are similar to the description on page 909, Vol. 71, of the *American Machinist*. The No. 3 chuck is power operated and has a capacity for 51-tooth, 6-8 pitch gears, and smaller.

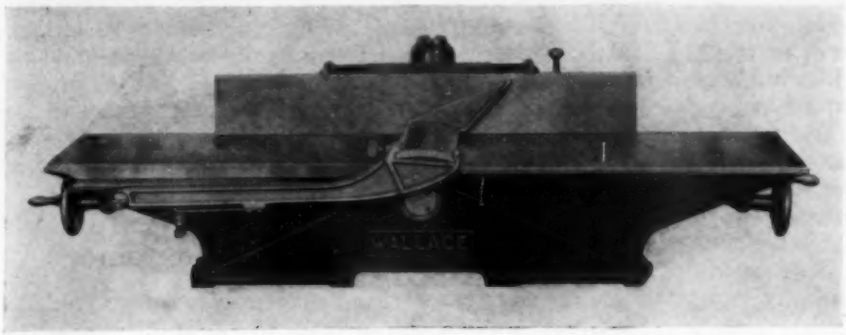


Bolender No. 3 Gear Grinding Chuck

Wallace No. 10 Hand Jointer

An 8-in. jointer known as the No. 10 has been placed on the market by J. D. Wallace & Company, 134-158 South California Ave., Chicago, Ill. This jointer is equipped with a skew-knife cutter head, in which the knife holder is die-cast around a steel shaft and the knives lay on flat surfaces. They are clamped in position with die-cast duralumin cover plates. The cutterhead is balanced and the skew angle is so fixed that one end of the knife leads the other end by approximately ½ in. Another feature of this cutterhead is the fact that it is mounted on two Timken tapered roller bearings.

The two jointer tables are cast of



Wallace No. 10 Hand Jointer, which may be employed in the pattern shop

semi-steel instead of the cast iron. An improved safety guard is also provided, and it is quick and positive in operation. The stock is pushed against the projecting horn and under the guard. After the cut, it drops back to its original position against an adjustable stop. When jointing the edges of wide stock, the cover plate of the guard is moved outward from the fence and locked in position. In surfacing it is not necessary to remove the hands from the stock, the cover plate of the guard being so narrow that the fingers can "walk over" it. It is of bench size.

Allen-Bradley Bulletin 830 Automatic Pressure Switch

For starting and stopping compressors and pump motors, the Allen-Bradley Company, 286 Greenfield Ave., Milwaukee, Wis., has announced its Bulletin 830 pressure switch. The design of the pressure switch follows new lines and is about the size of a small outlet box.

Allen-Bradley Bulletin 830 Automatic Pressure Switch Unit at the top. Below —Switch mounted in a cabinet

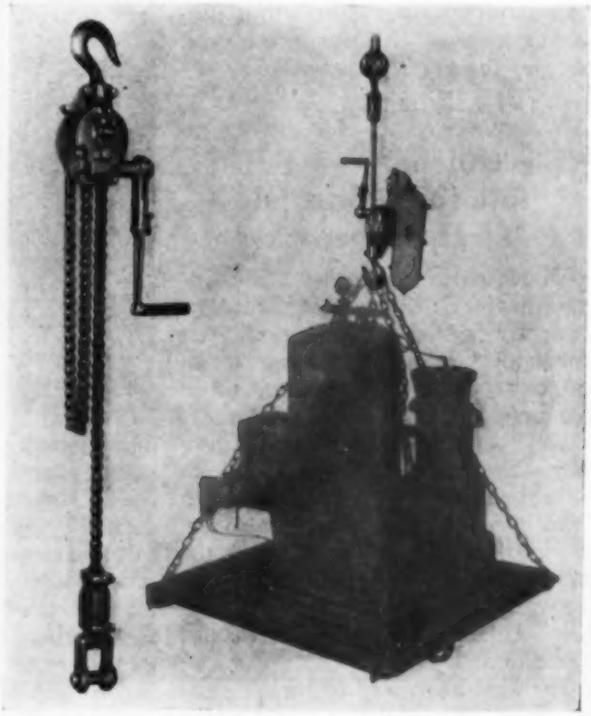
The Size B pressure switch is made in four forms in various combinations with or without overload breakers, disconnect switches, and fuse clips. This unit is rated at 1 hp. on 110-220 volts d.c., and 1 hp. for 110 volts, and 2 hp. at 220 volts, on a.c. circuits.

The Size C switch is rated up to 5 hp. For larger ratings, the Size B pressure switch is used as a pilot control for magnetic starters.

Matthews "Pullift" Hoist

A one-man hoist, known as the "Pullift" and having a capacity of 5,000 lb., has been placed on the market by the W. N. Matthews Corporation, Forest Park Blvd., St. Louis, Mo. Any length of chain can be used, thereby multiplying the uses of the tool and greatly simplifying the work. The "Pullift" is fast in operation, since 1,000 lb. can be lifted at the rate of 16 in. per min. and heavier loads proportionately. Safe operation is assured because the load is always carried on the tool, and is not transmitted back to the operator through the rachet handle.

A magazine, as shown in the second figure of the accompanying illustrations, provides a safe means of keeping the free end of the chain from coming into accidental contact and catching on the machinery hoisted. A hook or clevice is supplied on each end of the chain or a hook on one end and a clevice on the other. The hooks and clevices are interchangeable. The Pullift has a take-up of five feet, when the magazine is not used, and a maximum take-up of 4 ft. 7½ in. when it is employed. It is said that high strength steels and malleable iron are used for various parts, and that the wearing pieces are heat-treated in order to insure long service.

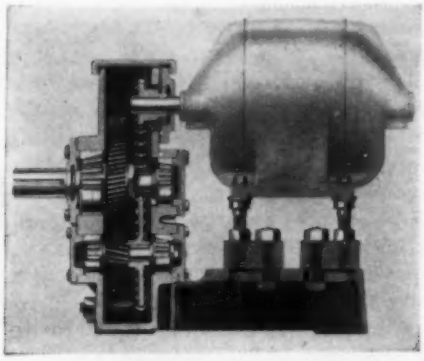


Matthews "Pullift" Hoist, which is capable of lifting 5,000 lb. showing a close-up view at the left and in use at the right

Cullman Improved Speed Reducer

Several improvements have been made in the speed reducer manufactured by the Cullman Wheel Company, 1346 Altgeld St., Chicago, Ill. Chief among these improvements is the substitution of Timken roller bearings for phosphor-bronze bearings. Another improvement is the use of helical gears in the place of spur gears.

On the Cullman reducer the first reduction is obtained by a chain and sprocket drive, from 2 to 6 times be-



Cullman Improved Speed Reducer, which is now equipped with Timken tapered roller bearings

low the motor speed. This not only cuts down gear wear, but also reduces noise. The gears are supported by four Timken bearings, which have the further advantage of taking up end thrust.

Changes have been made in the oiling arrangement at the main gear bearing and at the point where the motor enters the reducer. At this latter point the hub of the sprocket has been extended into the oil chamber, replacing the ring previously used. A spray of oil is furnished at all points by the sprocket chain. At each bearing there is a circular recess with a bottom outlet, which provides complete drainage of the oil back into the interior of the reducer, thus preventing leakage. No change has been made in the over-all dimensions.

"Electrolene"—A Substitute for Industrial Hydrogen

An industrial gas called "Electrolene," which is better than hydrogen for many industrial applications, can now be produced by feeding steam and city gas or other hydrocarbons into an electric cracking device developed by the General Electric Company, Schenectady, N. Y. It is claimed that this gas can be made at about one-tenth the cost of hydrogen, and is of use in furnaces where the atmospheres must be controlled for heat-treating processes, and also for metal cutting and other industrial fabrication.

The heat necessary for cracking is generated by electricity. The cracking device, one model of which is shown in the accompanying illustration, occupies small floor space. A model for producing 1,500 cu.ft. per hour would be in the form of a cylindrical shell 7 ft. in diameter and about 10 ft. high.

The principal advantage of using Electrolene is the low cost involved in the manufacture and the maintenance of the equipment. An installation in the plant of the above company at Schenectady produces gas for less than $1 per 1,000 cu.ft., whereas an equivalent gas (hydrogen) would cost approximately $10 per 1,000 cu.ft. The installation is only of 1,000 cu.ft. capacity.

Among other advantages claimed for this process are: the small amount of attention required; the flexibility of output, application, and operation; and the gas can be produced as required up to the limits of the equipment.

According to the manufacturer, this gas has most of the advantages of hydrogen and lacks many of its

General Electric "Electrolene" Cracking Apparatus for producing a hydrogen substitute

disadvantages. It will burn with a higher flame temperature; is more readily applied to cutting because of the ease with which a neutral flame can be produced; and in heat-treating processes, it can be applied with neutral effect, whereas hydrogen will absorb carbon from the work and city gas or other hydrocarbons will add carbon to the work.

Chemically, "Electrolene" is composed largely of hydrogen and carbon monoxide. Small percentages of methane and nitrogen are also present, but carbon dioxide, illuminants and oxygen originally present in the city gas are absent from the cracked product. The characteristics of the cracked gas can be varied somewhat in actual manufacture, if necessary.

Nissly Floor Liner

To define traffic aisles through a plant and to keep the work in progress in proper order, a floor liner has been developed by Walter S. Nissly, 43 N. Clinton St., York, Pa. The machine will paint a line as rapidly as the operator can walk, is easy to operate and handle, and can be moved in restricted places. It will draw a line within 1 in. of stationary objects, and any kind of paint can be used. Furthermore, the line is drawn from the side of the machine in full view of the operator. Gravity feed and easy cleaning are other features.

The paint tank has a capacity of 4 gal., from which paint is fed to the applicator by releasing a valve at the bottom of the tank. This is effected by means of a handle check. By moving the machine forward the bristles on the rear of the brush open ½ in., thus allowing the paint to be fed to the surface and brushed out, and giving uniform coverage and straight edge lines. When the applicator is drawn up from the sur-

Nissly Floor Liner

face, the rear bristles automatically close against the inserted flap, making a clean-cut stop of the painted line. The height of the machine over-all is 41 in., and the width and length are 13 by 18 inches.

Marquette Cushioned Press Bed

A press bed with built-in pneumatic cushions which can be adapted to any size of press, either old or new, has been announced by the Marquette Tool & Manufacturing Company, 1900 N. Kilbourn Ave., Chicago, Ill. One of the chief advantages of the built-in design is that the mechanism forms an integral part of the bed and does not extend below it. In this way expensive pits or special foundations are not required, and it is possible to regroup the presses about the shop according to production demands without being restricted by the necessity for special foundations. Fig. 1 shows an outside view of one size of bed which has a bolster area of 60x108 in. Other sizes can be obtained to suit requirements.

As the cross-sectional view, Fig. 2, shows, simplicity of construction and the presence of few moving parts are evident. Two pneumatic cushions are built into the semi-steel base of the bed, and the design is such that the inside of the bed serves as a displacement chamber for the compressed air. In this particular size, each piston is 32 in. in diam. and under a normal operating pressure of 80 lb. per sq.in. a total blankholding pressure of about 128,000 lb. is developed. On account of the large volume of air in the system little increase in pressure takes place during the down stroke of the press when the cushion is in action.

Three hydraulic packing rings backed by springs act as piston seals and in addition there is a cup leather at the bottom. The bed is connected directly to the line with an air regulator valve, and a gage reveals the pressure in the system at any time.

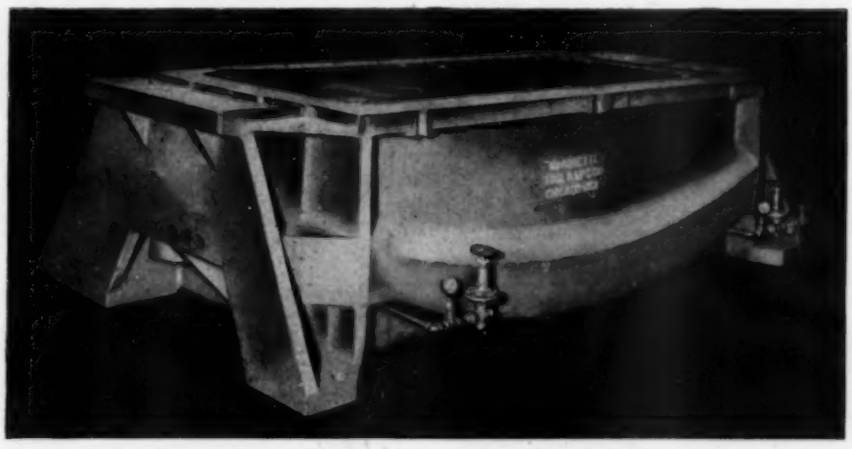


Fig. 1—Marquette Cushioned Press Bed

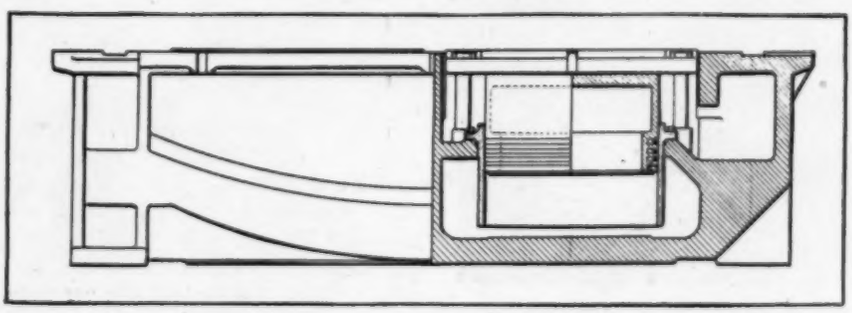


Fig. 2—Details of construction of the Marquette Pneumatic Press Bed

Boston Light-Duty Speed Reducers

Three types of light-duty speed reducers have been placed on the market by the Boston Gear Works Sales Company, North Quincy, Mass. All of these reducers are especially adapted to the transmission of light loads under continuous operation. They have a hardened steel worm with a phosphor-bronze worm gear, and are equipped with Timken tapered roller bearings throughout.

The Type AB reducer, Fig. 1, has the gear shaft over the worm shaft, and will transmit $\frac{1}{6}$ hp. with the motor running at 1,800 r.p.m. Ratios are 5 to 1, 10 to 1, and 20 to 1. The Type AD is similar to the type AB, but is especially adapted to installations requiring the use of a $\frac{1}{4}$-hp. motor running 1,800 r.p.m. Ratios in this model are 9 to 1, 18 to 1, 36 to 1, and 58 to 1. A third model, Type UC, has the worm shaft over the gear shaft and is of $\frac{1}{6}$-hp. capacity, the motor running at 1,800 r.p.m. A ratio of 48 to 1 is available. The Type AB weighs 8 lb., the Type AD, 13 lb. and the Type UC, 8 pounds.

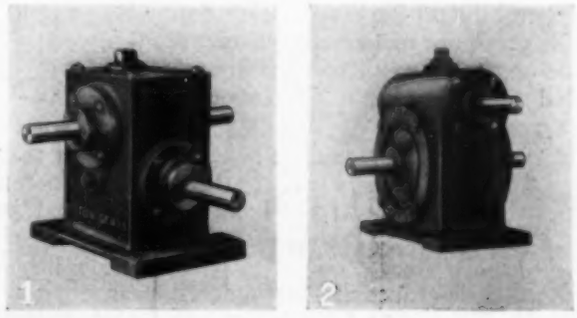


Fig. 1—Boston Type AB Worm Gear Speed Reducer ⅛ hp. capacity. Fig. 2—Type UC Light-Duty Worm Gear Reducer of ⅛ hp. capacity

Brown & Sharpe Nos. 728 B & C Railway Car Wheel Gages

Two gages for use in car wheel work have been announced by the Brown & Sharpe Manufacturing Company, Providence, R. I. The first of these, No. 728B, is known as the maximum flange thickness gage for cast-iron wheels, and is used to check the flange thickness of new wheels. It is made of tool steel, accurately machined and hardened. The

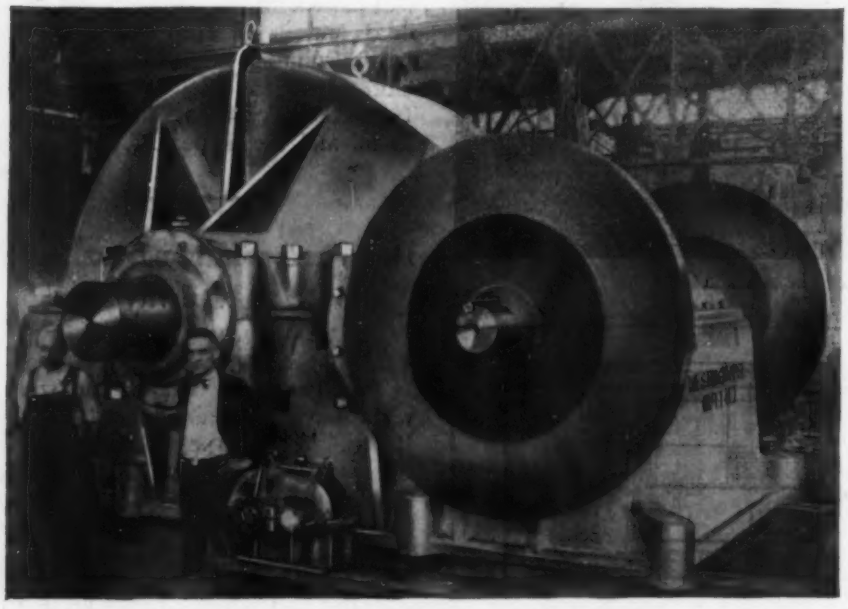
Brown & Sharpe No. 728B Maximum Flange Thickness Gage for Cast-Iron Wheels

gage goes down over the flange with the leg flat on the tread, if the wheel is of correct size.

The second gage, the No. 728C, is known as the standard mounting and check gage for cast-iron and cast-steel wheels. If the wheels are mounted correctly, the back of one flange and the face of the other flange come in contact with the gaging faces. To provide rigidity with the least possible weight, the tie-bar is of T-section. The gages are of tool steel, hardened and accurately machined, and are riveted to the tie-bar. Both of these gages conform to A.R.A. standards.

Westinghouse-Nuttall Large Mill-Drive Gear Unit

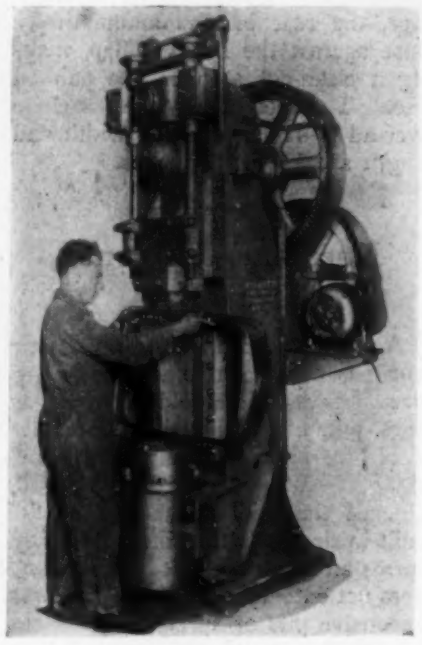
A double-reduction gear unit for driving rolls in a steel mill has been completed by the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa. The unit transmits power from a 1,600-hp. motor running at 705 r.p.m. through two sets of gears having a ratio of 14 to 1. For the first reduction, two sets of helical gears are used. These are mounted one at each end of the high and intermediate speed shafts. Between the helical gears on the intermediate shaft is the pinion which drives the slow herringbone gear. Sleeve bearings are used throughout. All rotating parts are lubricated by a splash system. This unit is capable of developing more than 2,000,000-in.-lb. at the low-speed shaft. The total weight including flywheels is about 40 tons.



Side view of Westinghouse-Nuttall 1,600-Hp., Double-Reduction Gear Unit for a steel mill drive

Marquette Riveting Machine

Equipped with a hydro-pneumatic die cushion, an unusual riveting machine has been placed on the market by the Marquette Tool & Manufacturing Company, 1906 North Kilbourn Ave., Chicago, Ill. This feature allows automatically for variations in thickness of the parts, providing necessary pressure to expand fully and head the rivets under all ordinary operating conditions. It yields, however, when oversize parts cause excessive pressure, which might otherwise result in crystallization of the metal in the rivet, straining the press, or breaking the crankshaft. If the work is undersize, the cushion rises and applies pressure. Where desired, it is possible to incorporate a special means for cutting out the cushion in a moment, making the press available for punching, forming, or other types of work.



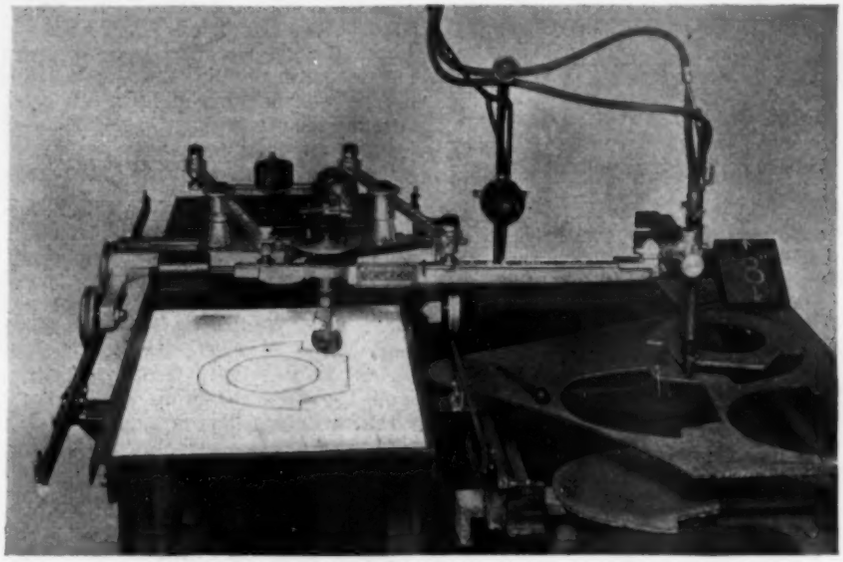
Marquette Riveting Machine

Two bearing points on the ram permit the working pressure to be distributed over a wide area. Off-center riveting can be done without the danger of spoiling the work or damaging the machine.

"Geweco" Medium-Size Automatic Shape Cutter

The gap between the large-size shape cutting machine able to do any kind of work and the very small unit with very limited cutting range for special work has been filled with the medium-size automatic shape cutting machine announced by the General Welding & Equipment Company, 70 Lansdowne St., Boston, Mass. This machine has a rectangular cutting range 2 ft. wide by 4 ft. long and is intended for general machine and welding shops. As three-quarters of all machine cutting work is not wider than 2 ft., the machine is of ample size for the majority of purposes.

The construction of the machine comprises a pivoted double-arm system jointed together for parallel movement and mounted on a carriage able to move longitudinally on a rail track. The jointed, pivoted arms produce a transverse movement perpendicular to the path of the carriage. In this way any point in the plane



"Geweco" Medium-Size Automatic Shape Cutter

can be covered. The front bar carries the drive and tracer and the extension of this bar carries the torch. Any path of the tracer is followed exactly by the torch.

The driving and tracing system comprises a wheel which can be steered by hand over a drawing. In order to work closely at sharp turns and corners, the whole driving and tracing system is mounted on a floating turntable. The machine is balanced by conveniently located weights, and the length can be increased by lengthening the table and rails.

James Spiral-Bevel-Gear, Right-Angle Speed Reducers

Two spiral-bevel-gear, right-angle speed reducers have been placed on the market by the D. O. James Manufacturing Co., 1114 W. Monroe St., Chicago, Ill. The first of these has a vertical driven shaft, whereas the second has a horizontal driven shaft. The spiral bevel gears are mounted on Timken roller bearings, and the output speeds may range as high as 2,400 r.p.m., but ordinarily do not go beyond 1,800 r.p.m., the motor speed. Ratings range from ¼ to 100 hp., and ratios from 1 to 1 and 6 to 1. Larger reductions are obtained by the combination of the spiral bevel gear and planetary spur gears with ratios of 8 to 1 to 1,500 to 1.

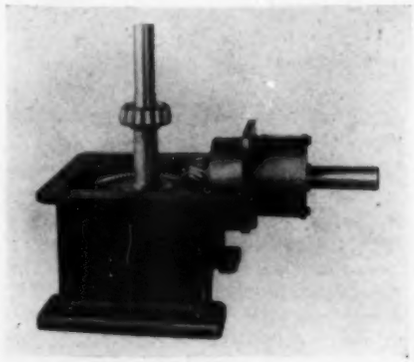


Fig. 1—James Spiral-Bevel-Gear, Right-Angle Speed Reducer of the vertical type

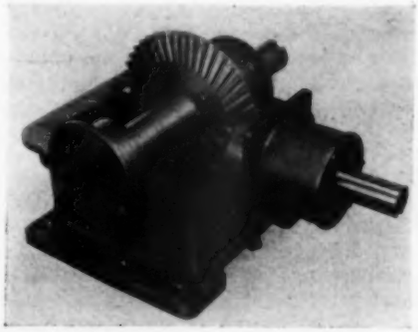
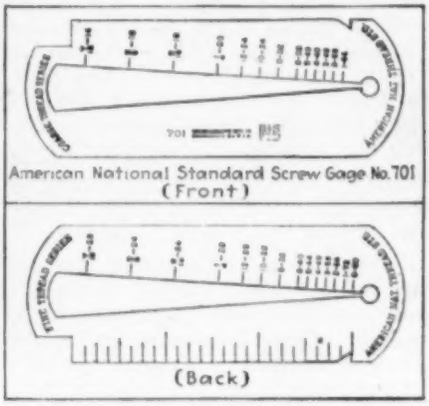


Fig. 2—James Spiral-Bevel-Gear, Right-Angle Speed reducer of the horizontal type

Brown & Sharpe No. 701 American National Standard Screw Gage

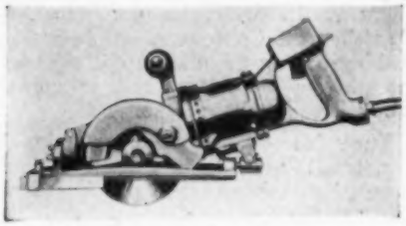
A handy gage for determining screw threads according to the American National (and U. S.) screw thread standards has been placed on the market by the Brown & Sharpe Manufacturing Company, Providence, R. I. One side of the gage is graduated for the fine thread series and the other side for the coarse thread series. A 3-in. scale graduated in eighths is provided on one outer edge of one side. This allows the length of screws to be determined. Slots at either end of the scale permit the heads of both round and flat-headed screws to be set against a positive stop.



Front and rear of the Brown & Sharpe No. 701 American National Standard Screw Gage

Van Dorn Portable Electric Saw

Three sizes of portable electric saws have been added to the line manufactured by the Van Dorn Electric Tool Company, Cleveland, Ohio.



Van Dorn Portable Electric Saw

These are 6-, 8- and 10-in. sizes, driven by universal motors, and incorporating an automatic safety switch and automatic telescopic guard.

These saws are fully adjustable, having thumb screw adjustments for regulation of depth of cut, width of cut, and a graduated adjustment for beveled cuts. The maximum adjustment for depth of the 6-in. saw is 1¾ in., 8-in. size, 2½ in., and 10-in. size, 3½ in.

REVIEW · OF · RECENT · PATENTS

Relating to the Machinery and Metal Products Industries

Parts and Mechanisms

The Kearney & Trecker Co. is assignee of patent 1,740,744 containing claims covering the use of an automatically controlled hydraulic feed and rapid traverse on a milling machine.

A speed-changing mechanism with an infinitely variable gear is covered by patent 1,733,704, granted to Ernest Abington Vessey, London, England.

A wire-feeding mechanism for arc welding machines, which automatically advances the electrode, is covered by patent 1,733,812 assigned to the General Electric Company.

The Delco-Remy Corporation is the assignee of patent 1,733,821 covering a method for counterbalancing shafts by means of retainers secured to the shaft and means for adjusting weights in these retainers.

Patent 1,733,863, assigned to the Cincinnati Grinders Incorporated, shows an automatic work feeding device for a centerless grinding machine.

Karl Lurf, of Germany, was granted patent 1,733,892 covering a clamping means for wheel lathes. This consists of a hollow spindle in the headstock and a device for clamping jaws on the axle.

The Keystone Reamer & Tool Co. was assigned patent 1,733,912 covering a reamer having a forward cutting end, a pilot portion, and an elongated fluted body.

Patent 1,733,931, assigned to the Goodell-Pratt Co., covers a lubricating bushing having an annular chamber for retaining a wick and a longitudinal groove on the inner surface.

The Norton Co. was assigned of patent 1,734,002, which shows a fluid circulating system for grinding machines. The feature of this patent is its self-priming pumping system.

Materials and Processes

A method of making lubricant nipples with integral projecting lugs for gun attachment is covered by patent 1,716,500 assigned to the Alemite Manufacturing Corporation. In one stage of the operation the lugs are a part of a turned flange the remainder of which afterward is sheared away in a die.

Patent 1,716,590 assigned to the Union Carbide & Carbon Research Laboratories, Inc., deals with a nonferrous welding rod containing 55 to 65 per cent copper, 0.01 to 4 per cent silicon and zinc, the copper and zinc content being at least 82.5 per cent of the total.

Charles H. Logue of Syracuse, N. Y., has been granted patent 1,716,924 on a method of burnishing bevel gears in which three such gears are meshed with a fourth and a rotary motion is imparted to at least one of the gears to establish relative rolling engagement of the three gears with the fourth gear.

Patent 1,722,195, assigned to the General Electric Co., deals with a method of welding wires by forming an electric contact between the end of one wire and a high potential circuit and then engaging the other end of said wire with the end of the second wire and completing the circuit.

TRADE PUBLICATIONS

ALUMINUM. The Aluminum Co. of America, Pittsburgh, Pa., has published three booklets on the working of aluminum. The first, "The Welding of Aluminum," gives specific instructions for the welding by torch of aluminum and its alloys, together with a brief description of the principles involved. The second booklet "The Riveting of Aluminum," shows the deviations necessary from common shop practice in riveting the metal and its alloys. The third pamphlet, "Screw Machine Products of Aluminum," shows the possibilities of the strong aluminum alloys for such work and lists standard parts.

BORING TOOLS. The Davis Boring Tool Co., 6200 Maple Ave., St. Louis, Mo., has published Bulletin 105 describing the Type "L" Expansion Reamer, giving illustrations, specifications, and prices.

BROWN & SHARPE TOOLS. The Brown & Sharpe Manufacturing Co., Providence, R. I., has published a booklet, "New Brown & Sharpe Tools," which supplements the company's catalogs No. 31 and No. 139. This shows micrometer calipers, depth gage attachments, telescoping gages, rod depth gages, drill point gages, cylindrical plug gages, ring gages, wire gage selectors, screw gages, car wheel gages and others.

CUTTERS. The O. K. Tool Co., Inc., Shelton, Conn., has published an "O. K. Stock List of Inserted Tooth Cutters." These include alternate angle keyseating or slotting milling cutters, half-side milling cutters either right or left hand, straight blade milling cutters, end mill or face milling cutters with solid arbors, a face milling cutter with a hole for use with an arbor, and others.

JIG BORING MACHINES. The R. Y. Ferner Co., Investment Building, Washington, D. C., has published Catalog No. 546, which covers the features of the four larger sizes of the jig borers made by the Société Genevoise D'Instruments de Physique, Geneva, Switzerland, for which the above concern is the U. S. and Canadian agent. Specifications and a list of accessories, together with a number of typical jobs done, are included.

LATHES. The South Bend Lathe Works, 425 East Madison St., South Bend, Ind., has published Catalog No. 91-A, on its "New Model" lathe. It gives information on the various sizes, new attachments, and export data in English, French, German, Spanish, and Portuguese. The booklet is very clearly illustrated throughout and contains 104, 9x6-in. pages.

SPEED REDUCERS, HERRINGBONE-TYPE. The W. A. Jones Foundry & Machine Co., 4401-4451 West Roosevelt Road, Chicago, Ill., has published Catalog No. 45 known as "Jones Herringbone and Herringbone-Maag Speed Reducers." It is divided into three sections. The first goes into the details of the herringbone gear and its manufacture; the second is devoted to tables of the ratings and selection of this reducer, and the third part consists of a large number of photographs showing actual installations. The catalog contains 80, 11x8½-in. pages.

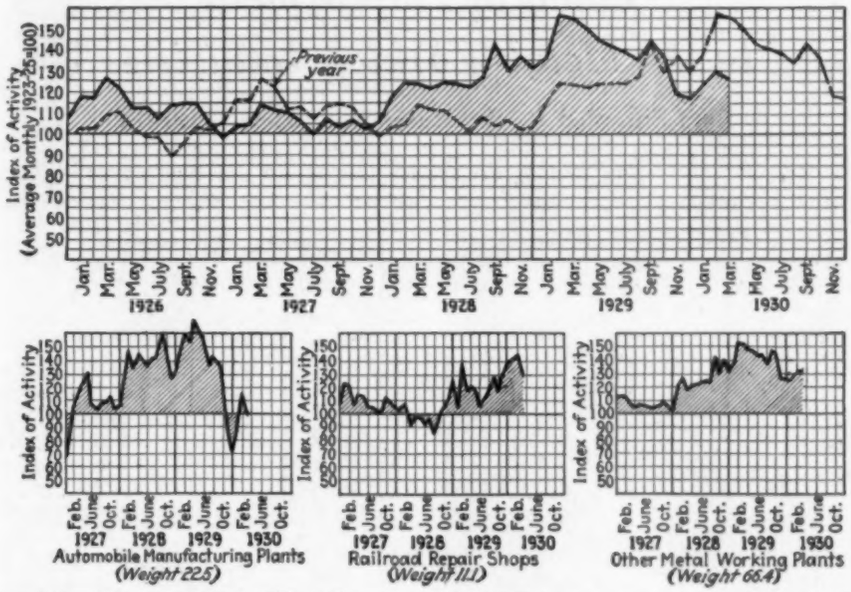
WEIGHING MACHINERY. Fairbanks-Morse & Co., 900 South Wabash Ave., Chicago, Ill., has published a bulletin "Beginning the Second Century," which is a very interesting and finely illustrated piece of institutional literature, covering the centennial anniversary of the company and going into the history of the development of weighing machines. It mentions also the development of Fairbanks-Morse motors and Diesel engines.

CAUSES OF DEATH BY OCCUPATION.—The U. S. Department of Labor, Bureau of Labor Statistics, has published Bulletin No. 507 of the Industrial Accidents and Hygiene Series, the title being "Causes of Death by Occupation." The booklet considers the industrial group as a whole, mortality according to occupation, and principal causes of death. It is for sale by the Superintendent of Documents, Washington, D. C., for 25 cents.

NEWS
OF THE WEEK

Metal-working Manufacturing Unsettled As Spring Months Begin

INCOMPLETE reports on the consumption of electrical energy for power purposes indicate that the metal-working industry is in an unsettled condition. Some plants report slight increases in the rate of operations during March as compared with February, while others report a decreased rate. In the aggregate, March operations were less, as compared with February, after corrections are made for working days.


Index of Activity (Average Monthly 1923-25=100)
Previous year
Jan. Mar. May July Sept. Nov.
1926 1927 1928 1929 1930
Index of Activity
Feb. June Oct.
1927 1928 1929 1930
Automobile Manufacturing Plants (Weight 22.5)
Railroad Repair Shops (Weight 11.1)
Other Metal Working Plants (Weight 66.4)

A large number of metal-working plants included in these incomplete returns indicate that the rate of operations during March was about 3.2 per cent less than that of February, and 15.1 per cent less than that of March, 1929, but was 6.1 per cent greater than that of March, 1928. The average rate of operations during the first quarter of 1930 was about 13.3 per cent less than that during the same period of 1929, but was about 1.4 per cent greater than that of the first quarter of 1928.

The automobile manufacturing industry, including the manufacture of parts and accessories, appears to have a slightly decreased rate of operations, although indications are that the actual rate of automobile production during March was about 4 per cent greater than that during February. The March rate of operations in these plants appears to have been about 11 per cent less than that of February, and about 33 per cent less than that of March last was about 1.5 per cent greater than that of February, but was still about 13 per cent less than that of the same month of last year.

Activity in the railroad repair shops during March appears to have been about 10 per cent less than that of February, but still 11.5 per cent greater than that of March last year.

Following are the indexes of operations in the metal-working industry as a whole, based on consumption of electrical energy and referred to 1923-25 as 100:

March, 1930	125.8
February, 1930	130.0
January, 1930	122.3
March, 1929	148.2

* * *

A.E.C. Appoints "Who's Who" Committee

A committee to co-operate in the publication of a new edition of "Who's Who in Engineering" has been appointed by the American Engineering Council. The function of the committee, according to Lawrence W. Wallace, executive secretary of the Council, is "to provide such advice on the qualifications of engineers as will enable the publishers to issue a work which shall be authoritative."

Members of the Committee are: R. F. Schuchardt, chief electrical engineer, Commonwealth Edison Company, Chicago; John S. Conway, Washington; Dr. Harry A. Curtis, Department of Chemical Engineering, Yale University; C. R. Dooley, Standard Oil Company, New York City; Colonel Frank M. Gunby, associate, Charles T. Main, Inc., Boston; Arthur Huntington, Iowa Railway and Light Corporation, Cedar Rapids, Iowa; B. A. Parks, Byron E. Parks and Son, Grand Rapids, Mich.; Dr. H. S. Person, managing director, Taylor Society, New York City; Dean A. A. Potter, School of Engineering, Purdue University, Lafayette, Ind.; George S. Rice, chief mining engineer, U. S. Bureau of Mines, Washington; F. F. Sharpless, consulting engineer, New York City; Robert Sibley, executive manager, California Alumni Association, University of California; Major Brehon B. Somervell, district engineer, U. S. Engineer Corps, Washington.

The Committee represents membership in the following societies:

American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Agricultural Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Grand Rapids Engineers Club, Society of American Military Engineers, Society of Industrial Engineers, Taylor Society.

* * *

Survey Associates Confer on Unemployment

Attended by some 300 manufacturers, railroad men, publishers, sociologists and bankers, and held under the auspices of the Survey Associates, Inc., a discussion on "Outflanking Unemployment, Management's Opportunity" was held in New York City on April 9. National authorities addressed the gathering at the Hotel Ambassador, among them Richard DeuPree, vice-president and general manager of the Proctor & Gamble Co., Julius H. Barnes, chairman, National Business Survey Conference, Miss Frances Perkins, industrial commissioner of the State of New York, and Miss Beulah Amidon, industrial editor of the *Survey Graphic*. The honorary chairman was Judge Julian W. Mack, and the chairman, Paul U. Kellogg, editor, the *Survey Graphic*.

Bad World Situation Affects Our Efforts at Team Play—The Farm Board—Screw Thread Commission

By Paul Wooton
Washington Correspondent, American Machinist

WASHINGTON, D. C., April 16—Team play in the United States intended to win back prosperity has been handicapped by an unexpectedly bad world situation. It is only now becoming fully apparent how much the South American situation has influenced world trade. Only one country on that continent is operating on a balanced budget. Caught in that situation by the fall in commodity prices, a very bad business situation has resulted which aggrevated the world situation. The long period of tight money followed by the uncertainties of setting up the Young plan depressed European trade. In spite of such a world situation, unity of action and good leadership in this country have revived business. While current figures do not compare favorably with the boom year of 1929, the contrast is not discouraging when the five-year average is used. There was a shrinkage of $20,000,000,000 in stock prices, but more than half of those losses have been regained. This in itself is a measure of the confidence that has been engendered.

Criticism of the Farm Board is coming from two quarters. Some complain because agriculture is not being sufficiently subsidized. The other camp objects to any direct aid. This later group has no objection to the encouragement of the co-operative movement, but they hold that the holding out of any reward, other than the benefits growing out of common action, is unsound. They contend that 100 per cent co-operation is not desirable as it would encourage abuse and lead to trouble. There is still another group, and it is the most numerous, which holds that the Farm Board is fully justified in what it has done. They argue that there otherwise would have been a collapse over wheat prices unparalled in the history of that trade.

Standard shapes and sizes of arbor holes for portable electric circular saws and grinding wheels were adopted at a conference of manufacturers and distributors held March 20 under the auspices of the Division of Simplified Practice of the Bureau of Standards. For grinding wheels the approved shape of hole will be round, while for saws, the shapes may be round or round with flat sides. The size of arbor hole for both wheels and saws is to be 1¼ inches in diameter, with 1 inch across flats where flattened sides are used. The recommendation of the conference will become effective Jan. 1, 1931. It will be published by the Bureau of Standards when signed acceptances have been received from manufacturers representing at least 80 per cent of the industry's production.

A program presenting several important problems brought out full attendance of the National Screw Thread Commission at the meeting on April 9. In connection with dimensions and tolerances for cut thread taps a tentative vote was taken that will result in bringing the report of the sectional committee of the A.S.A. and the 1928 report of the Commission into agreement. A final vote will be taken at the next meeting of the Commission.

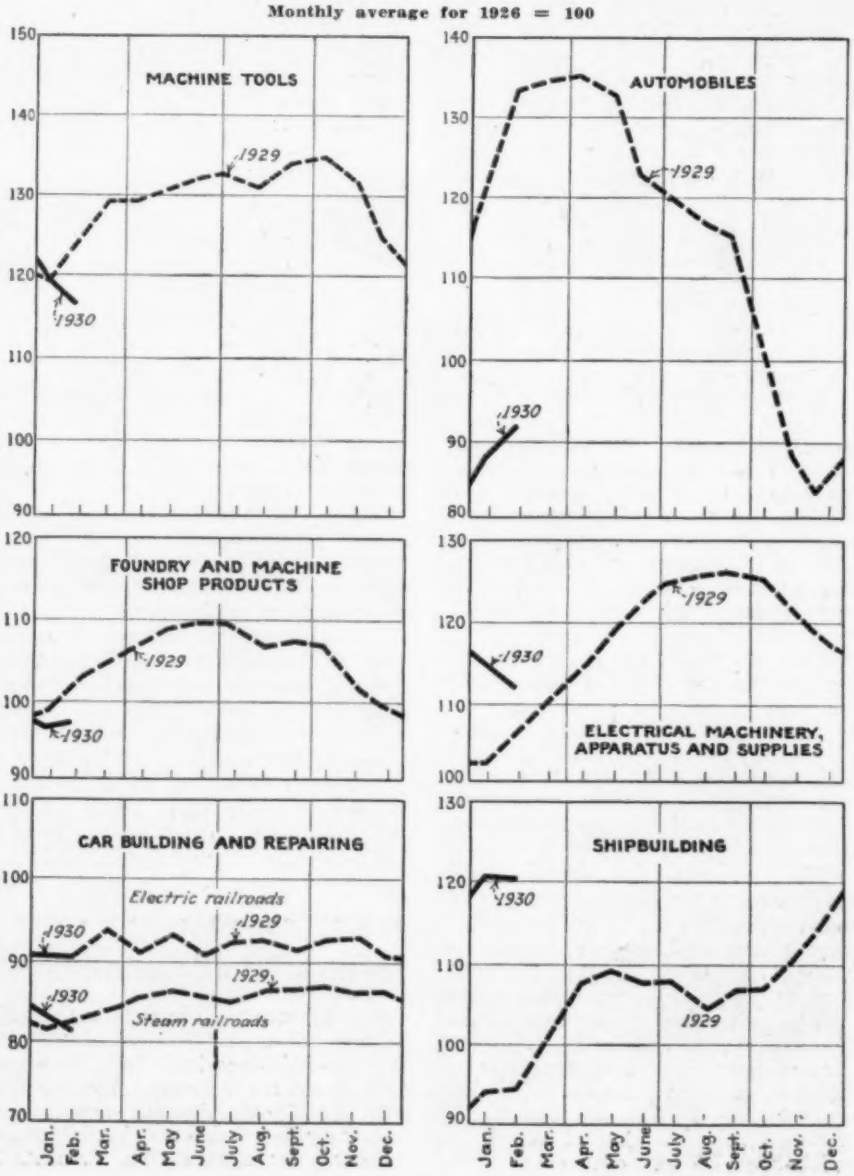
With a view to harmonizing the requirements of the N.S.T.C. and the handbook of the S.A.E. on the fine thread series in diameters above 1½ in., a subcommittee representing the two organizations will co-operate in an endeavor to obtain absolute uniformity. Some discrepancy has crept in with respect to pitches that the Commission feels should be corrected.

The proposal for undertaking a co-operative investigation to determine the extent of present adherence to American screw thread standards was discussed, but no action was taken.

* * * *

Trend of Employment in the Metal-Working Industries

Data Supplied by the Bureau of Labor Statistics



National Metal Trades Association Holds Annual Convention

J. G. Benedict to head Association for coming year; Jacob D. Cox, Jr., is first vice-president and Harry C. Beaver, second vice-president

THE National Metal Trades Association is holding its thirty-seventh annual convention at the Hotel Astor, New York City, during the present week. Officers elected include: J. G. Benedict, general manager, Landis Machine Co., president; Jacob D. Cox, Jr., president, Cleveland Twist Drill Co., first vice-president; Harry C. Beaver, vice-president, Rolls-Royce of America, Inc., second vice-president; and John W. O'Leary, president, Arthur J. O'Leary & Son Co., treasurer. Councillors elected for the coming two years include: F. J. Shepard, Jr., treasurer, Lewis-Shepard Machine Co.; H. F. Wahr, president, Mesta Machine Co.; Angus S. MacDonald, president, Snead & Co.; E. C. Bayerlein, vice-president and treasurer, Nordberg Manufacturing Co.; C. R. Gardinor, president, International Silver Co.; and Harold C. Smith, president, Illinois Tool Works.

Major topics pertaining to industrial relations, business conditions, stabilization of employment, production methods, management policies and problems, pension plans, methods of wage payments, safety, sanitation, foremanship and apprentice training, and kindred subjects of economic importance to the metal trades industry of the country, are featuring the talks and discussions at the convention.

Alfred Reeves, manager of the National Automobile Chamber of Commerce, discussed "The Automobile Industry and Prosperity," at the afternoon session of the convention, on April 16, and E. K. Hall, vice-president of the A. T. & T., spoke on "Essentials in Personnel Policies." Other speakers at the afternoon session included Hon. Albert H. Vestal, whose topic was "Value of Business Opinion in Congress," and George E. Roberts, who spoke on "Business Conditions."

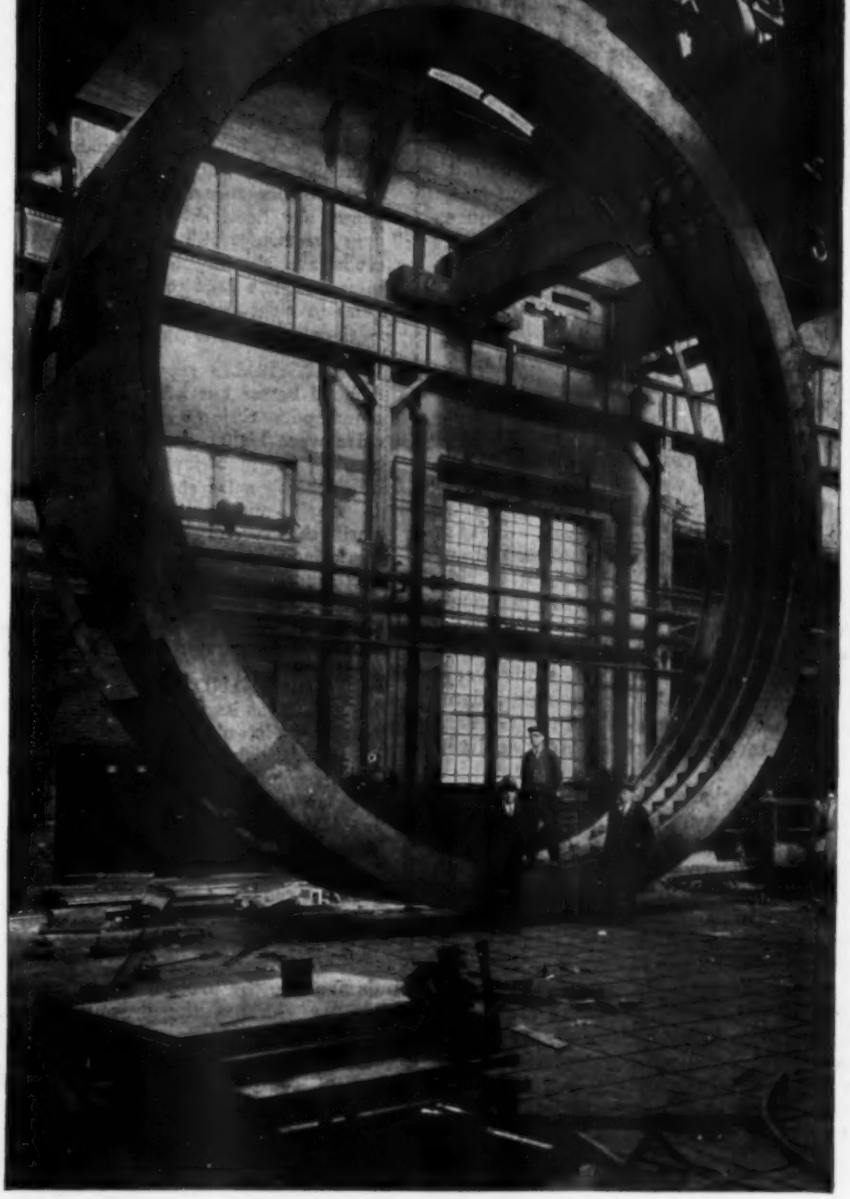
The Wednesday morning program featured talks on "Leadership in Raising the S-51," by Commander Edw. Ellsberg, and "The Stabilization of Employment," by Samuel A. Lewisohn. Reports of officers opened the session on Wednesday morning, and a "good fellowship get-together luncheon" was served at noon.

Walter Gordon Merritt spoke on "Legislative Proposals In Congress," at the Thursday morning session. L. F. Loree talked on "Relations of Management with Capital and Labor." Harold Falk discussed "Industrial Education," followed by reports of committees and the election of officers.

Floyd Gibbons was guest speaker on the subject "Adventures of a Headline Hunter" at the banquet on Wednesday night. The convention closes tonight, April 17, with a joint luncheon and sessions in the afternoon and evening between the National Industrial Conference Board and the National Metal Trades Association.

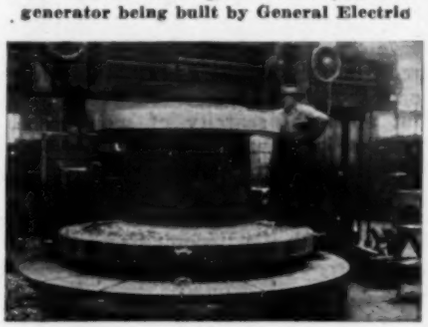
* * *

THE Cleveland Engineering Society recently held a 3-day 50th anniversary celebration, including inspection trips to a number of plants in the Cleveland territory, and other entertainment. The high spot of the celebration was the Fiftieth Anniversary banquet.



Jewelry for Giants

The ring and "collar button" are the 44-ft., 100,000-lb. frame and the 12 ft. spider hub for the new Spier Falls 37,600-kw. generator being built by General Electric



BUSINESS · BAROMETER

Probabilities favor a spring of increasing activity followed by a summer of prosperity

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

A STOCK exchange wit is said to have remarked that the difficulty of deciding whether the market would go up or down was extraordinary when it was obvious that it could only move in one of two directions. This is true, but it is not as difficult to understand as is the predilection for the "long" interest that is shown by nearly all investors and speculators.

Just after the collapse of last November it was rumored that the decline was due to the malevolent activities of the bears. The Stock Exchange authorities thereupon made an investigation which completely negatived the reports in circulation, and showed that the short interest had been and was almost negligible.

For the sake of society it is well that human nature is constructive, but it sometimes leads to over-optimism and the sacrifice of their individual fortunes by those who fail to realize that things wear out with marvelous rapidity, and that wealth is spent or wasted almost as quickly as it is created.

Were it otherwise, humanity would now be oppressed by an overwhelming burden of capital, for someone has figured out that $1.00, compounded annually at the rate of 1 per cent per annum, for the 5,934 years that have elapsed since the world was created, according to the Bible, would have produced $43,973,149,000,000,000,000,000. This sum, if converted into gold, at $20.00 an ounce, would exceed the weight of the sun. Inasmuch as the world's national wealth as now estimated is hardly more than fifteen hundred billion dollars, it is plain that society has not made very much progress in saving since Adam and Eve were driven out of the Garden and had to go to work in order to live.

The experience of past generations has not, however, diminished the confidence of those who live in the living present, and are content to let the dead past bury its dead. Their enthusiasm seems to have been re-established, and they are again buying stocks as well as commodities on a large scale.

These observations express the larger view of the situation. There are many details, such as bank clearings, car loadings, and building constructions, that might be cited as partially explaining the recovery of confidence, but they are like the leaves of the autumn. The wind that blows them about is the cause rather than the effect of their gyrations. These winds are like the profounder influences which are shaping the present course of events, and are in a measure beyond human control.

One of these influences is the ease with which the credit distention of last autumn was reduced. Another is the action of the United States Government in undertaking to sustain the price of agricultural commodities by purchasing them on an enormous scale. Still another is an almost fatalistic belief that the world will come ultimately to some agreement that will prevent war even though the present Naval Arms Conference in London decides to adjourn without taking action.

Any one of these three factors considered by itself would be accounted a major influence, and in combination they are almost omnipotent.

Permanent peace, inexhaustible credit, and Uncle Sam's use of the latter to support the market for farm products form a trinity that is irresistibly bullish. In the world of business this view of the case is being accepted gradually. As yet, however, its acceptance has not become apparent in distributive trade. Department stores, chain stores and mail-order houses are still reporting that sales are under last year; one reason is that Easter is late. Unemployment is, however, decreasing, and the building contracts awarded during March are said to be within 5 per cent of last year's total.

It is admitted by the trade reviews that the steel mills are not quite so busy as they were, but if building and automobile manufacture increase as expected steel is bound to pick up. The automobile industry still has a long way to go to full-time activity and although a gradual increase in output is under way, it is not great enough to stimulate business very much. We now have an automobile for every five persons in the United States, and it has become plainer that we must rely mostly upon our export trade for any further increase.

In New York, the monetary situation is becoming a little closer. The resources of the New York banks show a decrease of a billion dollars as compared with last year. These figures were made up for the Comptroller of the Currency, and are as of March 27, 1930. It is now clear that the Federal Reserve System is less disposed to force credit into the markets, willy-nilly, than some thought two or three weeks ago. But any real scarcity of money still seems a long way off, and the probabilities appear to favor a spring of increasing activity, with a summer of prosperity, provided nothing happens to interfere with the Federal Farm Board.

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From this page the reader will get a quick picture of current business and industry. The boxed material below is a summady of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

LITTLE CHANGE has occurred in machinery and machine-tool markets during the week. Demand is keeping up well but has ceased temporarily its weekly improvement; general business is said to be improving steadily. Inquiries in most sections have also slowed up slightly, although they seem to be for tools for more immediate demand. Deliveries on many standard lines are immediate, and prices are firm, showing no tendency to change either way. Railroads are showing a little more interest. The used tool market is quiet in most sections, although it is showing improvement.

INDIANAPOLIS reports railroad demand better but automobile demand off. Chicago machine-tool sales were higher during the first quarter, but inquiries are dropping off. Detroit sales show no change in April, and none is expected until the second quarter. New York inquiries and orders slowed up, orders coming from unusual sources and showing real work on the part of dealers. Southern District business is improving steadily.

NEW ENGLAND is demonstrating a little of its famous conservative attitude, although there are plenty of bright spots. Cincinnati dealers and manufacturers are split on the situation, some claiming improved conditions, others a slight falling off. Canadian outlook is promising, and railroad demand is good.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

INDIANAPOLIS

Considerable uncertainty is developing in the machinery and machine-tool business in this section. There are high spots and low spots. Demand from the automobile industry is poor. The accessory plants are buying requirements, which are about equal to last year, and the body plants are buying some special machinery.

Railroad requirements in this state seem to be picking up. No large orders are being placed, but there are a number of small orders being placed. The Pennsylvania has just opened a monster locomotive repair plant in this city and several roads are putting more men to work in the shops.

Demand for construction equipment is improving steadily as the season advances.

Demand from the steel trade, particularly the structural and sheet trade is good, perhaps a little better than last year. There is a fair volume of business for the special requirements of the woodworking and sawmill trade, though this will not be more than last year, manufacturers believe. The airplane industry is buying a good volume of small tools for repair purposes. The summer should see a fair demand for coal mining machinery.

CHICAGO

From a number of sources reports are received that there is a perceptible tendency toward a higher level of business in the machine-tool industry. On the other hand, there are those—manufacturers' agents and distributors—who say their experience does not bear out this optimistic outlook. Generally speaking, however, and judging by reports on the average of sales booked during the first quarter of 1930, improved conditions prevail. The president of one local concern which acts as selling agent for diversified lines of shop equipment informed the writer that his company's sales for the first three months of the present year materially exceeded those for the same period of 1929. This, however, was exceptional, most of those questioned on the subject saying that business for the quarter suffered greatly by comparison with that of last year. Inquiries are reported as decreasing in some measure. Railroad buying continues fairly active but is largely confined to single tools and small lots. Industrial demand during March was slightly better than for the weeks preceding, but has not been nearly up to expectations. As for some time past, builders of agricultural machinery and tractors are the leading customers for machine-tools.

DETROIT

April sales of machinery and machine tools in the Detroit field are about equal to March and there is no prospect of an improvement in the near future. Thus far in 1929 there have been few sales of any importance and the general level of business has been disappointing to nearly all dealers. The reports for April do not indicate that business is on the upgrade.

The automobile industry, the one big market for machinery and tools in this district, is going forward at a fairly healthy rate after its serious curtailment of the last six months. The plants are not buying equipment, however, and this is generally attributed to the fact that they are uncertain as to the future and unwilling to make anything but the most essential expenditures. This assertion is borne out by the fact that dealers are receiving a large number of inquiries for almost all types of equipment, but are making practically no sales.

A number of dealers here are of the opinion that conditions are likely to change for the better before the end of the second quarter. The contract jobbing shops are still running at a slower pace than at any time in many years.

NEW YORK

Both inquiries and orders slowed up slightly in the New York machinery and machine-tool market during the past week, and thus stopped the unbroken series of slight rises in preceding weeks. In one or two instances, business showed some increase, but from unusual sources. One dealer reported sales to the Navy and to municipalities, another several sales of machine equipment to wholesale grocery chains. What sales are being made are for single items and of no particular class of tool.

The D. & H. railroad has inquired for a list of eight tools, including a radial drill, several lathes, a screw machine, boring mill, hacksaw, and a car-wheel lathe, the inquiry approximating $60,000 worth of business. The General Electric is buying a few tools, principally in the process of standardizing motor frame sizes and for the refrigerator plant. Railroad business, exclusive of the D. & H. inquiry, is exceptionally slow. General business conditions are good, but quiet.

SOUTHERN DISTRICT

While there has been no single instance of unusually heavy buying of machinery and machine-tools since the first of the year, and sales volume does not compare favorably with the first three months of 1929, machinery and machine-tool dealers have been experiencing steadily improving business. The poor and discouraging month of January was superseded by a more favorable February, and March volume was, comparatively, very satisfactory.

Orders for the most part were scattered, both as to plant groups and geographical locations. The Southwest section has been the first to respond to a generally improving condition in the South, particularly in the Houston area. The Birmingham district lends promise, based on future business, while in the vicinity of New Orleans occasional good inquiries mount optimism, only to be followed by the quiet that has characterized the market for more than four months. With an unusually severe winter behind them and generally warm weather prevailing in practically the entire area, it is likely dealers will share in considerable replacement business, although very little promise is held out for expansion programs of large proportions.

Used-tool sales were better during March than in either January or February; prices were fair to slightly better, and deliveries for the most part were satisfactory.

NEW ENGLAND

There is but slight change in the New England machine-tool market from one week to the other. Executives find it a matter of conjecture when volume buying will start. But the situation in the machine-tool industry is good in itself. The attitude of watchful waiting which has featured business for several months is more a result of outside influences than internal factors.

Through the last week of March and the early weeks of April enough bright spots have appeared to warrant the belief that slow improvement is underway. As a whole the employment situation has shown gains. In some industrial centers plants show schedules as low as 60 per cent of normal, but the average level of activity is placed at 75 per cent normal. New England railroads have recently placed orders for cranes, coaling and conveying equipment. One railroad is considering a number of tools for a machine shop. Foreign proposals unplaced include boring and grinding equipment and turret lathes.

CINCINNATI

About one-half of the machine-tool manufacturers of the Cincinnati district report a slight improvement in the general market, the remainder report no appreciable change. While business has not improved since the first of the month to the extent expected, a spirit of optimism continues to prevail.

Although few, if any, of the manufacturers are carrying large stocks, they have, as a rule, enough standard tools to meet the demand without undue delay of shipments, and special tools are being delivered in a reasonable amount of time. Production is at a good level, there being a good backlog of business booked to sustain manufacturing activities, and there is no unemployment of skilled mechanics in this industry.

The week's sales and inquiries were largely confined to single tools and replacements, both being well scattered over the different sections of the country.

Selling agents report no important business change, demand in local and adjacent territory remaining at a fair level and being largely confined to single tools and replacements.

CANADA

The general outlook in the machinery and machine-tool market in Canada is promising and the industry has entered the second quarter with a confident tone. The dominant factors in the situation are the steadily increasing demand for railway equipment and construction machinery and tools. It has recently been estimated that the two major railroads will spend this year more than $100,000,000 on the construction of new branch lines, equipment, and the erection of terminal facilities. The plants producing railway equipment and heavy construction material have already been awarded large contracts. The iron and steel industry has also entered upon a very active period.

Another encouraging feature is that automobile production is increasing. The February output numbered 15,548 units as compared with 10,388 in January. The March figures are not available as yet, but it is understood that they will show a satisfactory gain over February.

A Great Steel Foundry in the Making

Better to be prepared to report and analyze the new foundry and machine shops of the General Steel Castings Corporation, Eddystone, Pa., when fully completed, seven McGraw-Hill editors spent Friday, April 11, at the plant. They were guests of George H. Houston, chairman of the executive committee, Augustus S. Blagdon, vice-president and general manager of the Eastern Division, W. B. Chambers, chief engineer, E. Walcher, manager of operations, F. C. Henke, mechanical superintendent, H. F. Ramsey, special engineering, and Donald Jacoby, special engineering.

Welding Society Announces Program

Welding of structural steel will constitute an important topic at the annual meeting of the American Welding Society to be held at the Engineering Societies Bldg., New York, April 23-25. Several papers will be devoted exclusively to that subject, while others will deal with general welding practice and applications. Four technical sessions, a dinner, and an inspection trip are scheduled, with a meeting of the American Bureau of Welding on the afternoon of the last day. The tentative program has been announced as follows:

Wednesday, April 23

MORNING

Business meeting, report of president and election of officers.
"Distribution of Stresses in Fillet Welds," by L. C. Bibber, bureau of construction and repair, navy department.
"Investigation of Beams Welded to Columns," by Cyril D. Jensen, Lehigh university.

AFTERNOON

Plant inspection.

EVENING

Board of directors' meeting.

Thursday, April 24

Architectural session covering welding from viewpoints of architect and builder. Three papers to be presented.

AFTERNOON

"Constructing Panel Heating by Welding at British Embassy," by representative of Wolff & Munier Inc.
"Battledeck Welded Floor Construction," by Lee H. Miller, American Institute of Steel Construction.
"Stiffness of Welded Beam Connections," by C. H. Jennings, Westinghouse Electric & Mfg. Co.

EVENING

Annual dinner.

Friday, April 25

MORNING

"An All-Welded Barge," by E. H. Ewertz, consulting engineer.
"The Needs of the Metropolitan District for Instruction in Welding," by R. F. McKay, International Oxygen Co.
"Welding of Tube Turns," by Nate Lord, Tube-Turns Inc.

AFTERNOON

Meeting of structural steel welding committee.
Annual meeting of American Bureau of Welding.

Business Items

The Mansfield (Ohio) Lock Washer Co., a division of the Reliance Manufacturing Co., is moving its entire mechanical production department to Detroit to a plant at French Road & Grinnell Ave., directly opposite the Municipal Airport.

The Vulcan Engineering Works, Ltd., Vancouver, B. C., has acquired the Wallace Foundry Co., Ltd., on Granville Island.

The Swartz Manufacturing Co., Freeport, Ill., has been merged with the Stover Manufacturing & Engine Co., Freeport. Carl H. Swartz, president and treasurer, becomes a member of the Stover board. Activities of the company will be transferred to the Stover plant and its lines will be continued.

J. G. BENEDICT
New President, National Metal Trades Association

Henry Prentiss & Co., Inc., is moving its principal office, New York City, to the Chrysler Bldg., 405 Lexington Ave. The offices will be occupied on April 21.

Henry Potez of Canada, Ltd., a branch of Henry Potez, aeroplane manufacturer of Paris, France, has chosen Cap de la Madeleine, in the province of Quebec, as a site for a Canadian factory. A foundry building recently purchased there will be renovated, and a large hangar will be built.

A 1-story service plant is being erected at the Moline (Ill.) Forge Co., factory, Forty-second St. and Fourth Ave., at a cost of $3,400.

The Atlas Imperial Engine Co., Oakland, Calif., recently installed a grinder said to be the largest in use on the Pacific Coast. The machine, manufactured by the Cincinnati (Ohio) Grinder Co., used for grinding crankshafts, is 24 ft. long, with a swing of 30 in. It was shipped from the factory in one piece, on a flat car.

The Van Sicklen Corporation, Elgin, Ill., a division of Allied Motor Industries, Inc., has acquired the Lorraine Corporation, Chicago, and is transferring its plant equipment to Elgin, where production will be continued.

The Stover Manufacturing and Engine Co. and the Swartz Manufacturing Co., both of Freeport, Ill., have been merged. Carl H. Swartz, head of the latter firm, becomes a member of the Stover board of directors, in charge of production and activities at the Swartz unit.

The Poole Tietzen & Co., Van Nuys Bldg., Los Angeles, closed its branch offices in Santa Ana, Santa Barbara, and San Diego recently. All business is now being carried on from the Los Angeles office.

The companies formerly operating as the Reed, Midwest, and National Air Filter Companies, consolidated on April 1 and will now function as one organization under the name of the American Air Filter Co., Inc., Louisville.

The Hawkeye Supply & Manufacturing Co., Mason City, Iowa, has been appointed Iowa distributor by the American Engineering Co., Philadelphia.

The Beacon Manufacturing Co., Newark, N. J., has been incorporated with $100,000 capital, to manufacture cutlery.

The Bendix Aviation Corporation, New York City, has acquired control of the Hydraulic Brake Co., Los Angeles.

The Dains Manufacturing Co. last week completed removal of its machinery from its plant in Allerton, Ill., to Charleston, Ill., where a Charleston firm has taken over the production of the Dains automobile accessory line. The Dains firm suspended operation in Allerton several months ago.

Personals

R. C. BIRD has become a sales engineer for the Chicago Steel Foundry Co., Chicago. Mr. Bird was with the Chain Belt Co. for four and a half years and for the past two years with the D. O. James Company.

L. H. BYRNE has been appointed acting western sales manager for the Jefferson Electric Co., Chicago.

HAROLD C. SMITH
Retiring President,
National Metal Trades Association

W. L. CAMERON, Newark, N. J., has been appointed direct agent in the New Jersey territory for Baker Brothers, Inc., Toledo, Ohio. His territory comprises that section of New Jersey north of Trenton, and the counties lying on the west bank of the Hudson as far north as Albany, including the city of Schenectady. Mr. Cameron was for years sales manager of Gould & Eberhardt and recently has been direct sales representative of the Monarch Machine Tool Co. in this territory. His appointment by Baker Brothers will be an addition.

HERBERT A. CARHART, for 20 years with the Remington Typewriter Co. at the Syracuse plant, is now with the Barr-Morse Corporation, Ithaca, N. Y., in the capacity of engineer. During the World War he was with the Lincoln Motor Co., Detroit, on Liberty motors, and wrote several articles for *American Machinist* on methods of tooling and machining this engine.

CHARLES H. CARROLL, formerly forgings buyer for the Ford Motor Co., Detroit, has been appointed steel buyer to succeed C. M. NELLES, who has been made general manager of sales.

R. B. CARTER has been elected secretary of the H. C. Cook Co., Ansonia, Conn., to succeed the late Frank H. Bradbury.

RODNEY CHASE, of the Chase Brass & Copper Co., Waterbury, Conn., returned recently from a European trip.

MORRIS CHECKOWAY and NATHAN GREENFIELD of Chelsea, Mass., have purchased the three-story factory at Newburyport, Mass., formerly occupied by the A. N. F. Shoe Co., and plan to manufacture shovels and farm implements.

B. M. CLARK, formerly assistant sales manager of the Heltzel Steel Form & Iron Co., Warren, Ohio, has been appointed sales manager to succeed WILLIAM J. SAVAGE, resigned.

M. E. COOLEY, dean emeritus of the Colleges of Engineering and Architecture, University of Michigan; E. L. RYERSON, Joseph T. Ryerson & Son, Chicago; and JOSEPH W. ROE, professor of industrial engineering, New York University, have been appointed engineering advisers to aid in the work of organizing the Industrial Museum founded in Chicago by Julius Rosenwald, president of Sears Roebuck. The appointments were announced recently by the American Engineering Council.

PHILIP B. GALE has been chosen chairman of the board of directors of the Standard Screw Co., Hartford, Conn. Mr. Gale, formerly president, is succeeded in that capacity by H. E. PENFIELD, formerly vice-president. W. D. CORLETT succeeds Mr. Penfield as vice-president. T. H. STERLING continues as secretary-treasurer, aand C. A. YOST as assistant treasurer.

THEODORE R. GERLACH, Joliet, Ill., president of the Illinois Manufacturers' Association, has announced plans for a series of three European tours for members and friends of the association during the coming summer months.

R. E. HULTGREN, service man for Pratt & Whitney, has gone to Chicago after seven weeks' work at the Portland (Ore.) airport headquarters of Varney Air Lines, instructing mechanics in proper overhauling of Wasp motors and in factory methods.

T. WORDEN HUNTER has been elected to the presidency of the Bach Aircraft Co., Inc., Van Nuys (Calif.), succeeding B. L. GRAVES, resigned.

GEORGE U. HARRIS, New York, has been elected a director of Lima (Ohio) Locomotive Works, Inc., to fill the vacancy caused by the resignation of his father, JOHN F. HARRIS.

H. H. HARRIS, president of the General Alloys Co., Boston, and a partner of Noble & Harris, consulting engineers, Detroit, returned recently from an airplane tour of Mexico in his personal plane as the guest of General Juan Andreu Almazan, Secretary of Communications and Public Works of the Republic of Mexico.

MELVIN E. HARTZLER has been put in charge of the recently opened Chicago office of the American Monorail Co., Cleveland, and will direct sales activities in midwestern territory.

EARL E. HODIL has been appointed chief draftsman for the Thomas Spacing Machine Co., Pittsburgh.

WILLIAM T. HUNTER has been elected president and general manager of A. Schraders' Sons, Inc., Brooklyn, N. Y.

He was formerly vice-president and general manager. Mr. Hunter was also elected a director of the Scovill Manufacturing Co., Waterbury, Conn., the parent organization.

C. GRANT ISAACS, Lynnville, Tenn., former manager of the Charlotte office of the Bureau of Foreign & Domestic Commerce, has been appointed assistant to Dr. Julius Klein, Assistant Secretary of the Department, according to an announcement.

G. H. JEWELL has been appointed western sales manager of the Glamorgan Pipe & Foundry Co., Lynchburg, Va., with headquarters in the Peoples Gas Bldg., Chicago. He was formerly assistant to the late W. D. Hess, western sales representative.

GEORGE KIDD, chairman of the board of control of the British Columbia Electric Co., has been made a member of the board of McLennan, McFeely & Prior, Ltd., Vancouver, British Columbia.

JORDAN KORP, metallurgical engineer for the Leeds & Northrup Co., Philadelphia, sailed for Germany on March 29 on the first leg of a three-month tour of European heat-treating plants. Several days before he sailed, Mr. Korp was given a surprise farewell dinner attended by 200 of his friends and fellow members of the Leeds & Northrup organization.

W. C. KYLE has resigned as sales manager of the Page Steel & Wire Co., Bridgeport, Conn., and W. H. BLEECKER, JR., has been appointed assistant sales manager.

A. W. LEMME, Elizabeth Street Foundry, Chicago, and C. B. MAGRATH, North Western Foundry, Chicago, have been chosen as president and secretary, respectively, of the Chicago chapter of the Gray Iron Institute.

R. H. MCGREDEY has become identified with the Harnischfeger Sales Corporation, Milwaukee, distributor for the Harnischfeger Corporation, and will be employed in an executive sales capacity with headquarters at 50 Church St., New York.

JOSEPH W. MEADOWCROFT, assistant works manager of the Edward G. Budd Manufacturing Co., Philadelphia, former president of the American Welding Society, and frequent contributor to *American Machinist*, sailed from New York recently for a six-months' trip to Europe.

G. E. MADDEN, Allegheny & Center Sts., Pittsburgh, has been appointed Pittsburgh representative for the Shanafelt Manufacturing Co., Canton, Ohio.

JOHN H. GOSS of the Scovill Manufacturing Co., Waterbury, Conn., has been elected a director of the United Founders Corporation.

N. H. MOTSINGER, president and general manager of the Marion (Ind.) Craftsman Tool Co., has announced that production at the plant will be begun immediately in the recently constructed building at Eleventh St. & Miller Ave. The new building is of brick and steel. The machinery and some of the equipment used in the old building will be removed to the new and additional equipment installed.

H. W. NOBLE has been appointed New York sales representative for the Box Crane & Hoist Corporation, Philadelphia, to succeed ARTHUR APPLETON, retired. The company's New York offices have been moved from 17 Battery Place to 30 Church Street.

J. D. OLIVER and JAMES OLIVER II, both of South Bend, Ind., were re-elected directors of the Oliver Farm Equipment Co., at the last annual meeting. Both South Bend men are pioneers in the farm implement field.

A. W. DANIELS has been elected vice-president in charge of sales of the

American Manganese Steel Co., Chicago. He has been general sales manager of the company since 1923, and was Chicago office manager for three years previously.

CHARLES PASCHE was re-elected president and treasurer of the Davenport (Iowa) Locomotive & Manufacturing Corporation, at the annual meeting of stockholders April 5. Other officers were elected as follows: GEORGE D. BESLER, vice-president; A. T. SEBELIEN, secretary; W. P. HAGEBOECK, treasurer; and H. ARZBERGER, assistant secretary-treasurer. The board of directors elected is as follows: Messrs. Pasche; Besler, chairman of the board, Central Railway of New Jersey; Hageboeck; J. W. Bettendorf, president of the Bettendorf Co.; E. P. Adler; T. J. Walsh, president, Walsh Construction Co.; H. F. Riley, president Clapp, Riley & Hall Equipment Co., Chicago; George D. Besler, Plainfield, N. J., and Charles Shuler, Jr.

J. G. PEARCE, director, British Cast Iron Research Association, London, will address the April meeting of the Detroit Foundrymen's Association, which has been postponed to May 2.

HARRY E. PENFIELD, vice-president of the Standard Screw Co., Chicago, has been elected president to succeed PHILIP B. GALE, now chairman of the board. W. D. CORLETT was elected vice-president to succeed Mr. Penfield.

J. H. POHLMANN of the J. W. Pohlmann Foundry, Buffalo, and A. U. OGDEN, of the Steel Drum Accessories Co., Buffalo, have been chosen as president and secretary, respectively, of the Buffalo chapter of the Gray Iron Institute.

T. M. REES has joined the staff of Manning, Maxwell & Moore, Inc., New York, and has been appointed manager of the Pittsburgh district in charge of sales of Putnam Machine Tools and Shaw Electric Cranes. In this capacity Mr. Rees will assist the Pittsburgh representative, the Arch Machinery Co., and will also direct the sales of Manning, Maxwell & Moore men assigned to that territory. Since 1928 until his present appointment, Mr. Rees was vice-president of the Arch Machinery Company.

DR. H. W. RICH, Glendale, Mo., formerly of Jerseyville, Ill., has been appointed vice-president and general sales manager of the Kauffman Metal Products Co., St. Louis, and has sold his interest in the Rich Electric Co., St. Louis.

CLEM A. SCHILL has been placed in charge of purchasing for the Schill Bros. Co., Crestline, Ohio.

EARL D. STEARNS, formerly vice-president of the Fairfield Engineering Co., Marion, Ohio, and former president of the Stearns Conveyor Co., Cleveland, has been appointed western sales manager of the Robins Conveying Belt Co., New York.

C. C. STEINHAUER was recently appointed Birmingham (Ala.) district office and warehouse manager for John A. Roebling's Sons Co., Trenton, N. J.

C. M. STEVENSON, until recently with the Philadelphia and Baltimore sales office of the Colonial Steel Co. and Vanadium-Alloys Steel Co., Pittsburgh, has been appointed sales manager for these companies at St. Louis.

LOUIS W. SUMNER was recently appointed Michigan representative of the Bellis Heat Treating Co., Branford, Conn., with headquarters in the Bank of Michigan Bldg., Detroit.

WILFRED SYKES has been appointed assistant to the president of the Inland Steel Co., First National Bank Bldg., Chicago, in charge of operations, with headquarters at the company's Chicago offices. He succeeds the late David P. Thompson.

JOSEPH THOMPSON, general manager of the Hammond (Ind.) plant of the Standard Steel Car Co., who has served with that plant for about 23 years, has resigned to live in Phoenix, Ariz. Mr. Thompson has been general manager for two years.

HAROLD E. WHITE has been elected a director of the General Parts Corporation, Flint, Mich., to succeed JOHN R. BODDE, resigned.

LESLIE C. WHITNEY is now chief metallurgist with the mill organization of Copperweld Steel Co., Glassport, Pennsylvania.

FRED A. WORTHEY has recently been appointed vice-president of the Axelson

Aircraft Engine Co., Los Angeles, Calif. Mr. Worthey has been with the Axelson Company for three years and has been in charge of aircraft engine sales work since the formation of the Axelson Aircraft Engine Division of the Axelson Machine Company.

Obituaries

ALFRED BROTHERHOOD, 83, formerly of New York City and Brooklyn, N. Y., died suddenly at his home in Aurora, N. Y., on April 1. Mr. Brotherhood established the machine-tool department for Cook & Beggs, New York, and later became associated with Manning, Maxwell & Moore, for whom he established a machine-tool department. At the age of 60 he retired.

ROBERT J. DAVIDSON, 79, treasurer of the Ramapo Ajax Corporation, Hillburn, N. J., with which he had been associated for 47 years, died on April 3 at his winter home in Daytona Beach, Fla. Mr. Davidson became secretary of the Ramapo Iron Works in 1883, and was an organizer of the Ramapo Foundry Company.

FRANCIS DOWNS WANNING, 57, chairman of the executive board of Farrell-Birmingham, Inc., Derby, Conn., died April 6 at the New Haven (Conn.) Hospital. Mr. Wanning had been identified with the Birmingham Iron Foundry for 35 years, and had been vice-president.

GEORGE O. PAGE, 79, who retired five years ago after 50 years service with the American Steel & Wire Co., Cleveland, died recently in that city. He served as machinist, foreman, master mechanic, and experimental engineer with the old Billings & Taylor Wire Fence Co. and the American Steel & Wire Co. until his retirement from active service in 1925.

GEORGE HURD BENHAM, 79, former treasurer of the Holmes, Booth & Hayden Co., Waterbury, Conn., a division of the American Brass Co., New York, died recently at his home in North Woodbury, Conn. He had completed 45 years of service in the brass industry when he retired in 1920.

FREDERICK WEINHAGEN, 76, who founded the Wisconsin Bridge & Iron Works, Milwaukee, now the Wisconsin Bridge & Iron Co., and was its president for many years, died April 4 at his old home in Hiledsheim, Germany, where he had been visiting for the past year.

ERNST KRAUSE, senior chief and president of the machine importation firm of Ernst Krause & Co., Aktiengesellschaft, Vienna, having offices in Vienna, Berlin, Prague, Budapest, and Warsaw, who planned to leave for the United States during May on the "Europa" to attend the Rotary Convention in Chicago on June 22 and to visit various American machine-tool manufacturers, died on March 30 in Vienna.

JOSEPH D. HARPER, 61, manager of the Diesel engine division of Fairbanks, Morse & Co., Chicago, with which he has been connected for more than 30 years, died on April 6 in Evanston, Illinois.

EMMANUEL OBERNDORFER, 87, head of the spring bed manufacturing company of New Haven, Conn., which bears his name, died at his home in New York on April 1.

R. H. PALMER, for over 50 years connected with the foundry industry and formerly instructor in foundry practice at Worcester (Mass.) Polytechnic Institute, died on April 1.

AUGUSTUS H. BULLARD
whose passing was recorded in last week's number

CHARLES ALFRED COCKS, associated with the American Abrasive Metals Co. for 18 years, died on March 29 at Linden, New Jersey.

CHARLES A. ANDERSON, 68, formerly chairman of the board of the Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, died on April 5.

WILLIAM H. MINER, 70, railroad supply manufacturer of Chicago, died at Plattsburg, N. Y., recently.

BENJAMIN RUPERT KENNEDY, 35, mechanical engineer, died at the New Rochelle (N. Y) hospital on April 4.

Forthcoming Meetings

AMERICAN WELDING SOCIETY—Annual meeting at Society headquarters, New York City, April 22-25. M. M. Kelly, 33 West 39th St., New York, is secretary.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—General Cost Conference at Hotel Cleveland, Cleveland, Ohio, April 22-23. E. F. DuBrul, 1415 Enquirer Bldg., Cincinnati, is general manager.

CHAMBER OF COMMERCE OF THE U. S. —Eighteenth annual meeting, Chamber of Commerce Bldg., Washington, D. C., April 28-May 1. Headquarters, U. S. Chamber of Commerce Bldg., Connecticut Ave. & H St., N.W., Washington.

NATIONAL POWER SHOW — Held in connection with the International Textile Exposition, Mechanics Bldg., Boston, Mass., April 28 to May 3. For information write to New England Association of Commercial Engineers, 53 Devonshire Road, Boston.

TAYLOR SOCIETY — Spring meeting, Columbus, Ohio, May 1 and 2. P. E. Henderson, 29 West 39th St., New York City, is assistant secretary.

AMERICAN FOUNDRYMEN'S ASSOCIATION — Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, May 12-17. C. E. Hoyt, 222 W. Adams St., Chicago, is secretary-treasurer.

STEEL FOUNDERS SOCIETY OF AMERICA—May meeting, Hotel Hollenden, Cleveland, Ohio, May 14. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

NATIONAL FOREIGN TRADE COUNCIL —Convention at Hotel Biltmore, Los Angeles, May 21-23. O. K. Davis, 1 Hanover Square, New York City, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS —1930 Summer Meeting, French Lick Springs Hotel, French Lick Springs, Ind., May 25-29. National headquarters are at the Engineering Societies Bldg., 29 W. 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Semi-annual meeting, Hotel Book-Cadillac, Detroit, June 9 to 12. Calvin W. Rice, 29 West 39th St., New York City, is secretary.

NATIONAL ASSOCIATION OF FOREMEN —Convention at Toledo, Ohio, June 6-7. Harry J. Baumker, 316 Tenth St., Toledo, is convention secretary.

NATIONAL ASSOCIATION OF PURCHASING AGENTS—Fifteenth annual convention, Stevens Hotel, Chicago, June 16-19. "Inform - A - Show" in conjunction. G. A. Renard, 11 Park Place, New York City, is secretary-treasurer.

STEEL INDUSTRY'S EXECUTIVES—Annual Iron & Steel Exposition. Under the sponsorship of the Iron & Steel Electrical Engineers, June 16-20, Broadway Auditorium, Buffalo, N. Y. John F. Kelly, 1010 Empire Bldg., Pittsburgh, Pa., is managing director.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual meeting, Haddon Hall, Atlantic City, N. J. June 23-27. C. L. Warwick, 1315 Spruce Street, Philadelphia, is secretary-treasurer.

STEEL FOUNDERS' SOCIETY OF AMERICA—Semi-annual convention, Greenbrier Hotel, White Sulphur Springs, Va., June 26-27. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

INTERNATIONAL CONGRESS FOR GENERAL MECHANICS — Liege, Belgium, Aug. 31 to Sept. 7. For information address Alb. Schlag, 4 Place Saint Lumbert, Liege, Belgium.

NATIONAL METAL CONGRESS—Twelfth annual Congress and Exposition, Stevens Hotel, Chicago, Sept 22-26. W. H. Eisenman, secretary of the A.S.S.T., 7016 Euclid Ave., Cleveland, Ohio, is director.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

THE recent increase of two points in discounts on jobbers' carloads of steel pipe has finally re-acted in the form of higher discounts at dealers' warehouses in New York and Chicago. The scrap market continues soft, with the exception of lead, which would indicate lack of demand for non-ferrous metals. Tin, however, rose ¼c. this week at New York. Aside from a normal seasonal demand for reinforcing bars and cast-iron pipe, the iron and steel trade is moving slowly. A very gradual improvement is noted both in automotive output and demand for fabricated structural steel.

(*All prices as of Apr.* 11, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20 26
Basic	20.26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10	3.35†	3.30	3.60†
No. 12	2.15	3.45†	3.35	3.65†
No. 14	2.25	3.55†	3.45	3.70†
No. 16	2.35	3.65†	3.55	3.80†
Black				
Nos. 18 to 20	2.35@2.55	3.85†	3.55	3.70
No. 22	2.50@2.70	4.00†	3.70	3.85
No. 24	2.55@2.75	4.05†	3.75	3.90
No. 26	2.65@2.85	4.15†	3.85	4.00
No. 28	2.80@3 0	4.75†	4.00	4.15
Galvanized				
No. 10	2.60@2.70	3.90†	3.80	3.55
Nos. 12 to 14	2.70@2.80	4.00†	3.90	3.65
No. 16	2.80@2.90	4.10†	4.00	3.75
No. 18	2.95@3.05	4.25†	4.15	3.90
No. 20	3.10@3.20	4.40†	4.30	4.05
No. 22	3.15@3.25	4.45†	4.35	4.10
No. 24	3.30@3.40	4.60†	4.50	4.25
No. 26	3.55@3.65	4.85†	4.75	4.50
No. 28	3.80@3.90	5.10†	5.00	4.75

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	56.02%	43.48%	55.5%	43.5%	57.3%	44.8%
3½ to 6 in. lap	52.6%	40.06%	53.5%	40.5%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	154
¾	.58½	2.875	2.469	.203
1	.76½	3.5	3.068	.216
1¼	.92	4.0	3.548	.226
1½	1.09	4.5	4.026	.237
2	1.48	5.563	5.047	.258
2½	1.92	6.625	6.065	.28
3	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

Thickness—Decimal Fractions	B.w.g. and	Outside Diameter in Inches—Price per Foot— ½	⅝	¾	⅞	1	1¼	1½
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095″	13	.21	.23	.25	.26	.27	.29	.31
.109″	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago:
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	3.75†
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00†
Cold drawn, round or hexagon‡	3.40	3.65	3.60
Cold drawn, flat or square‡	3.90	4.15	4.10
Structural shapes	3.30†	3.00	3.10†
Soft steel bars	3.25†	3.00	3.00†
Soft steel bar shapes	3.25†	3.00	3.00†
Soft steel bands	3.75†	3.65	3.20†
Tank plates	3.30†	3.00	3.10†
Bar iron (2.75 at mill)	3.2	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, ¾-in. thick by ¼-in. wide. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— 5/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ⅛, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			39.75@40.75
Lead, pigs, E. St. Louis	5 50	New York	6.75@ 7.25
Zinc, slabs, E. St. Louis	4.95	New York	6.25@ 7.25

	New York	Cleveland	Chicago
Antimony, slabs	10.50@11.00	11.50	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	28 25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28 25	28.25	28.25
Brass rods, high, base	21 25	21 25	21 25
Brass wire, high, base	23 75	23 75	23 75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.25@11.00	11.75	10.11
Solder (½ and ½).....	28.50	27.50	26@28
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			56.00
Commercial genuine, intermediate grade.....			42.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.25

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.75@15.25	13.50	14.00 @14.50
Copper, heavy, and wire..	13.50@14.00	13.00	13.00 @13 50
Copper, light, and bottoms	12.00@12.25	12.00	12.00 @12.50
Heavy lead.....	4.25@ 4.75	5.25	3.50 @ 4.00
Tea lead.....	2.75@ 3.00	3.25	2.50 @ 3.00
Brass, heavy, yellow.....	7.75@ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.25@11.75	12.50	10.25 @10.75
Brass, light.....	6.25@ 6.75	7.00	6.25 @ 6.75
No. 1 rod-brass turnings.	9.00@ 9.25	8.00	8.00 @ 8.50
Zinc.....	2.50@ 2.75	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.02⅝	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.148	.164	154
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.034	.034	.035
Brass rods.....	per lb..	.2125	.2125	.2487½
Solder (½ and ½).....	per lb..	.285	.2925	.35
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.....	per 100.	4.59	4.59	3.60
Lard cutting oil.....	per gal..	.75	.75	.55
Machine oil.....	per gal..	.33	.33	.33
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs....	off list..	50–10%*	50–10%*	50–10%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....	Connellsville,		2.60
Coke, prompt foundry, per net ton.....	Connellsville,		3.50@4.85
White lead, dry.....	100 lb. kegs	New York,	13.75
White lead, in oil.....	100 lb. kegs....	New York,	14.25
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, ⅞-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$8.50
Cast iron welding flux, per lb., net.....	.35
Bronzing flux, per lb., net.....	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

D. C., Washington — A. L. Flint, General Purchasing Officer of Panama Canal, will receive bids until May 1 for electric welding machine, power hacksaw, electric grinding machine, electric portable drill, pipe-bending machine, etc.

Mass., Boston—Owner, 62 North Beacon St. —portable electric drill, grinder and garage jack.

Mich., Detroit—T. D. Shea Co., 7040 Seven Mile Rd.—one shaper.

Mich., Detroit—Williams Mfg. Co., 4860 St. Aubin Ave. (diemakers)—boring mill, planer and equipment.

O., Cleveland — Fanner Mfg. Co., Brookside Park—three spindle drill press.

O., New Philadelphia — A. W. Rieser Mfg. Co.—machinery and equipment including automatic machine, combination stamping machine and air compressor for shop.

O., Westerville—Bennett Mfg. Co., C. R. Bennett, Gen. Mgr. (machinery manufactures) —combination wood working machines, planer and air compressor, etc.

Ore., Portland—Montague Stove & Furnace Works, R. T. Montague, Pres., 101 West Columbia Blvd.—machinery and equipment for proposed 2 story, 60 x 150 ft. enameling plant. Estimated cost $150,000.

Ont., Brampton—Calders (Canada) Ltd., 1388 St. James St. W., Montreal, Que.—equipment including 100 ft. retort for creosoting plant, here.

Ont., Sandwich—Cadwell Sand & Gravel Co., 228 Sandwich St. W., F. E. Brian, Mgr.—machinery and equipment, including lathes, drill, shaper and grinders for proposed 1 story, 50 x 135 ft. machine and repair shop. Estimated cost $30,000.

Ont., Windsor—Technical School Board, T. A. Pillon, Chn.—interested in prices on complete equipment to cost $150,000 for machine shops, etc., in connection with 2 story, 80 x 120 ft. technical school on Giles Blvd.

Opportunities for Future Business

Ark., Jonesboro—Reliable Furniture Co., M. Ratinoff, awarded contract for a 1 story, 60 x 140 ft. furniture factory on Creath Ave.

Calif., Long Beach—Long Beach City School Dist., will soon award contract for the construction of a junior high school, including shop buildings, etc. Estimated cost $300,000.

Calif., Ontario — Edison Electric Appliance Co., is having preliminary plans prepared for addition to shop.

Conn., New London—Adams & Hillyer, 152 Howard St., is having plans prepared for the construction of a forge, blacksmith and machine shops at Smith and Hamilton Sts. Estimated cost $45,000. Private plans.

D. C., Washington — Bureau of Yards & Docks, Navy Dept., awarded contract for extension to boilermakers shop at Navy Yard. $35,740. Noted Mar. 13.

D. C., Washington—Washington Railway & Electric Co., 14th and C Sts., will begin construction on a 1 story garage. Estimated cost $350,000.

Ind., Elkhart—Time-O-Stat Co., awarded contract for the construction of a 60 x 250 ft. factory on McNaughton Ave. Estimated cost $46,200.

Ind., Gary—Bd. of Education, plans the construction of a 3 story high school at 46th and Madison Sts. Estimated cost $1,000,000. W. B. Ittner Inc., 911 Locust St., St. Louis, Mo., Archt.

Ind., Terre Haute—Good Will Industry, 126 North 5th St., is having plans prepared for the construction of a factory. Estimated cost $42,000. Private plans.

Ia., Sioux City—Benson Furniture Co., c/o I. Benson, Pres., is having plans prepared for the construction of a 5 story, 80 x 110 ft. factory at 4th and Morgan Sts. Estimated cost $80,000. Architect not announced.

Mass., Cambridge (Boston P. O.)—Parker Page Lumber Co., First St., awarded contract for the construction of a 2 story, 40 x 130 ft. warehouse.

Mass., Quincy (Boston P. O.) — Bethlehem Shipbuilding Corp. Ltd., 100 Milk St., Boston, awarded contract for a 1 and 2 story boat and rivet shop. Estimated cost $40,000. Noted Apr. 3.

Mass., West Gloucester (mail Gloucester) — Russia Cement Co., Essex Ave., N. C. Phillips, in charge, plans the construction of a 1 story machine shop. Private plans.

Mass., West Roxbury (sta. Boston)—Park Dept., 33 Beacon St., awarded contract for the construction of a 1 story garage and shop at Franklin Park Yard.

Mo., Harviell—Harviell Stave & Heading Co., will build a stave factory. Estimated cost $50,000. Work will be done by local labor.

Mo., St. Louis—Kinloch Brass Casting Co., 2356 Palm St., awarded contract for a 1 and 2 story, 40 x 105 ft. machine shop at Howard and 22nd Sts.

Mo., St. Louis—Terminal Railroad Association, 1800 Market St., will build a 1 story, 85 x 180 and 85 x 190 ft. addition to locomotive shops at 515 South 12th St. Estimated cost $50,000.

N. J., Montclair—Lewis & Leonard, 51 East 42nd St., New York, N. Y., Archts., will receive bids about May 1 for the construction of a 2 story garage, etc., on Grove St. for White Motors Sales Inc., 640 Bloomfield Ave. Estimated cost $150,000. Noted Feb. 6.

Every one of these items is reported by our authorized correspondents who are instructed to verify every item sent in. This free weekly service is published in the interests of the buyer and the seller, to bring them together and get machinery moving.

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BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York

N. J., North Bergen — Township Commission, Municipal Bldg., will receive bids about May 15 for the construction of a 3 story, 90 x 110 ft. garage and signal station, etc. Estimated cost $150,000. R. B. Glenn, Municipal Bldg., Archt. and Engr. Noted Apr. 3.

N. J., Paterson—Bd. of Education, City Hall, will receive bids about May 15 for the construction of a 2 story school, including manual training department, etc., at Tremont, Illinois and Michigan Aves. Estimated cost $300,000. Lee & Heurtt, 152 Market St., Archts. Noted Feb. 20.

N. J., Paterson—J. Holt, 132 Market St., Archt., is receiving bids for a 1 story, 50 x 150 ft. warehouse, garage, etc., on Van Houten St. for Silk City Electric Supply Co., 43 Broadway. Estimated cost $150,000.

N. Y., Brooklyn—Herman Glaberson, 2401 Ave. I, will receive bids about May 1 for a 4 story, 75 x 88 ft. garage at State and Court Sts. Estimated cost $100,000. Seelig & Finkelstein, 153 Pierrepont St., Archts. Noted Apr. 10.

N. Y., Brooklyn — Shell Eastern Petroleum Products Co., 122 East 42nd St., New York, will soon receive bids for the construction of a garage at 420 Oakland St., here. Estimated cost $50,000. R. Shutkins, 147 4th Ave., New York, Archt. Noted Apr. 10.

N. Y., New York—Bristed Estate, 784 Park Ave., will receive bids after July 1 for the construction of a 4 story, 16 x 75 ft. garage at 50 Downing St. Estimated cost $50,000. F. E. Vitolo, 50 East 45th St., Archt. Noted Apr. 3.

N. Y., Olean—New Olean Metal Cabinet Co., awarded contract for the construction of a factory. Estimated cost $100,000.

O., Cleveland—The Lorain Icer Co., E. J. Hart, Mgr., 3933 St. Clair Ave., manufacturers of refrigerators, awarded contract for the construction of a 2 story, 100 x 296 ft. factory at 9515 Carr Ave. Estimated cost $75,000.

O., Cleveland—Newman Mfg. Co., I. Newman, 403 Western Reserve Bldg., (wholesale novelties), is having plans prepared for a 4 story, 31 x 115 ft. factory destroyed by fire at 1293 West 9th St. Estimated cost $40,000. P. Matzinger, 1227 Prospect Ave., Archt.

O., Cleveland—Winton Engine Works, G. W. Codington, Gen. Mgr., 2116 West 106th St., awarded contract for the construction of a 2 story, 35 x 153 ft. factory. Estimated cost $40,000.

O., Columbus—Standard Oil Co. of Ohio, Gas Bldg., Cleveland, is receiving bids for a 1 story, 50 x 75 ft. service station at Port Columbus, also 1 story, 80 x 100 ft. service station at East Broad St., here. Estimated cost $30,000 and $40,000 respectively. Private plans.

O., Westerville—Bennett Mfg. Co., awarded contract for the construction of a 1 story, 50 x 100 ft. factory. Estimated cost $30,000.

O., Xenia—Dept. of Public Works, A. T. Connar, Supt., Columbus, will soon award contract for the construction of a vocational training school for Ohio Soldiers' and Sailors' Orphans Home here. R. S. Harsh & Associates Inc., 122 East Broad St., Columbus, Archts. and Engrs.

Pa., Easton—Easton Airport Corp., plans the construction of an airport including hangars, machine shops, etc., here. Estimated cost $150,000. Private plans.

Tex., Houston—Midwest Piping & Supply Co., Inc., 1450 South Second St., St. Louis, Mo., awarded contract for the construction of a 1 story, 200 x 220 ft. plant at Bringhurst and Cline Sts., here. Estimated cost $250,000.

Tex., San Antonio—Bd. of Education, c/o J. A. McIntosh, Water St., plans the construction of a 2 and 3 story 240 x 380 ft. senior high school. Estimated cost $1,000,000. Phelps & DeWees, 618 Gunter Bldg., and Adams & Adams, Real Estate Bldg., Archts. W. E. Simpson Co., 942 Milam Bldg., Engr.

Tex., San Antonio—City, C. M. Chambers, Mayor, plans an election May 7 to vote $100,000 bonds for airport improvements, including hangars, repair shop, etc. I. Ewig is City Engr.

Wash., Seattle—City awarded contract for the construction of a shop building, warehouse, etc., at San Point air base. $178,700.

Wash., Seattle—National Pole Treating Co., awarded contract for fabrication and erection of large steel tanks and steel smokestack at plant here.

Wisconsin — Milwaukee Electric Railway & Light Co., 217 Michigan Ave., Milwaukee, awarded contract for a 1 story, 62 x 109 ft. garage and storage building at Delafield, also 1 story, 62 x 130 ft. garage and storage building at Hales Corners. Estimated cost $44,000 and $40,000 respectively.

Wis., La Crosse—Trane Co., awarded contract for a 1 story, 160 x 260 ft. factory.

Ont., Ottawa—City plans the construction of a workshop, garage, etc., on Wellington St. Estimated cost $175,000. A. F. Macallum, City Hall, Engr.

Ont., St. Catherines—W. S. Tyler & Co., 3615 Superior Ave., Cleveland, O., awarded contract for a 1 story factory for the manufacture of ornamental iron, screens, etc., on Ontario St., here. Estimated cost $125,000. Noted Mar. 27.

Ont., Toronto — Hamilton Gear & Machine Co., 76 Van Horne St., awarded contract for the construction of a 1 story addition to gear and machine plant. Estimated cost $50,000.

T. H., Pearl Harbor—Bureau of Yards & Docks, Navy Dept., Washington, D. C., will soon award contract for extension to motor testing building, here.